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OCT. 25
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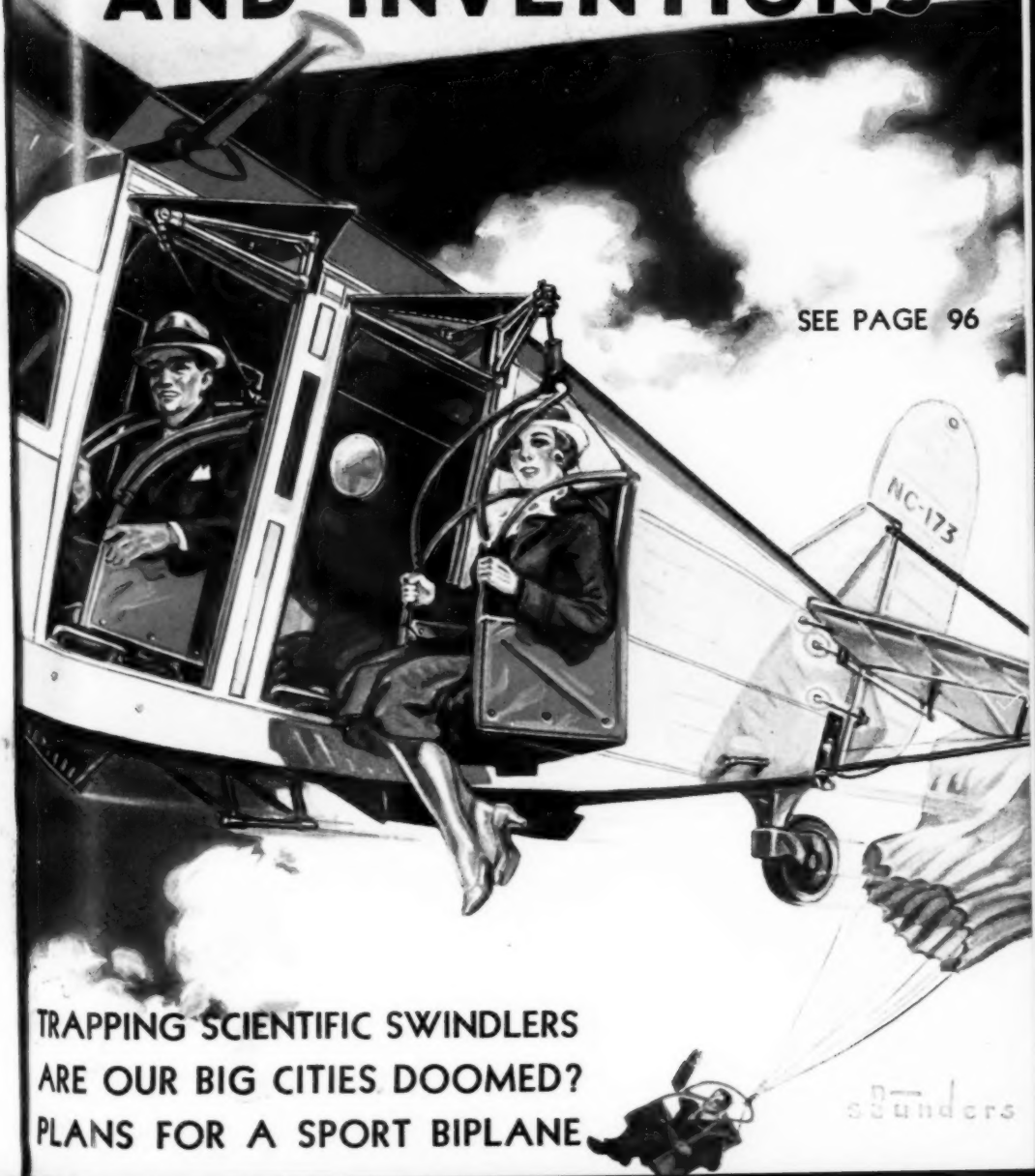
MODERN MECHANIX AND INVENTIONS



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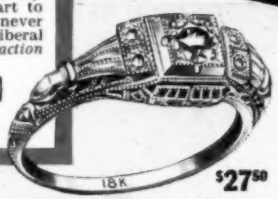

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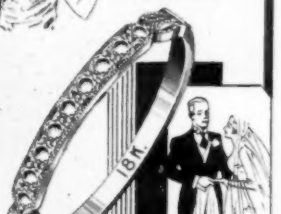

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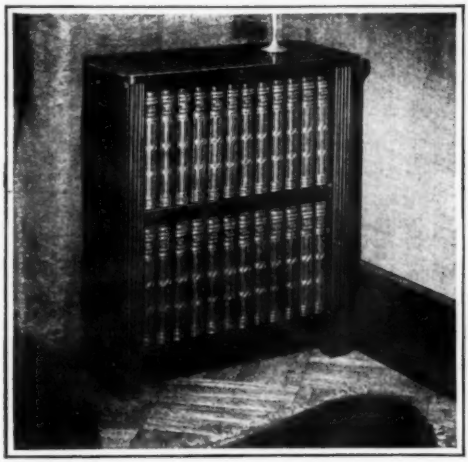

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I'VE only been selling about a year. When I broke in, though I realized that trained salesmen are the highest paid men in the world, I expected the going to be hard at first. It was—a lot harder than I'd expected, even. At the end of six months I was commencing to get discouraged. I certainly hadn't made a flop of it—but I wasn't getting the results I should have had.

Naturally, seeing other fellows who started right with me go right ahead, I realized something was wrong. A particularly disheartening thing was the fact that at times I'd be right on the point of closing a good-sized order—and all of a sudden, it would go "flop." In fact, it kept happening all the time. I was doing something, I knew, that was killing those sales.

Finally I decided that I had to do something. I had been hearing a lot about National Salesmen's Training Association. But I'd never investigated them. Then, one day, I read one of their announcements. I was amazed to find how comprehensively they covered the training of salesmen. Furthermore, they announced that they were sending a most unusual volume, "The Key to Master Salesmanship" to ambitious men who asked for it—not only experienced salesmen, but men who had never sold, but wanted a chance in this highly paid field.

Naturally, I wrote for it—it seemed to me that here was the certain solution to the errors I had been making. Imagine my surprise—and interest—when there arrived, not only one book, but two. To this day I can't decide which of those books helped me most. The little book which I had not been expecting was just what I needed at the time. It was written for men just like me—men who had been plugging along in salesmanship—never successful, never so hopeless that they quit selling. And while "The Key to Master Salesmanship" gave me an insight into the real secrets of salesmanship, the other book, "Mistakes Commonly Made in Selling" was the one I could first get practical use from.

Right in the first few pages, I saw some examples quoted. They were things I had been doing every day. I'd never dreamed they were dangerous errors. The more I thought about them, the more clear it became, though, why I was having such difficulty with my closes. I thought to myself: "By golly, that's why Barnes decided to put off buying, this very afternoon!" I kept on thinking of men whose orders I had lost, through just that very mistake. There were six of them.

The next morning I sallied out, bright and early to see if I couldn't save those sales, using the tips given me. Before noon, I had put the practical suggestions of that little book to work—and sure enough, in every case, I made the sale which I had thought was gone glimmering. Six sales saved—at $15 commission apiece, that was $90 made, by one morning's work, plus the advice of a little book that cost me nothing!

Of course, that set me to thinking. If that one piece of knowledge could make me $90, how much would I make out of having all the knowledge which the National Salesmen's Training Association could give me? It didn't take long to figure that one out, either! I was enrolled for the full training that same night; and the next two weeks saw my sales record soar. Not a minute of time lost—I studied just in spare hours but I learned things in those spare hours that I'd never have picked up, just by my own experience.

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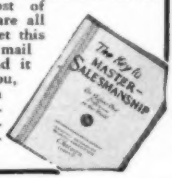

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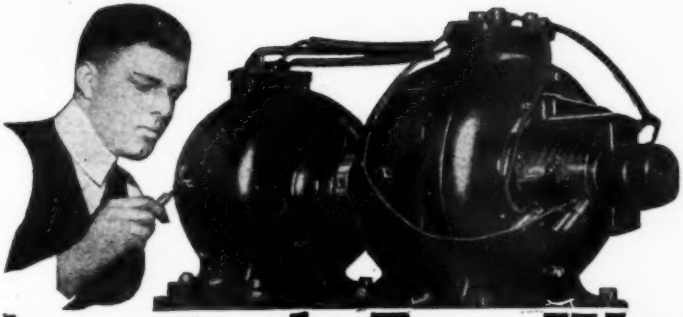

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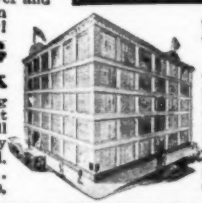

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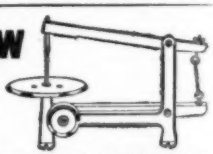

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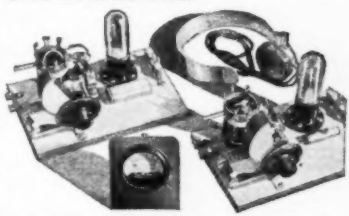

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Plans for this great little inboard speed runabout will appear shortly in Modern Mechanix and Inventions. Top left is seen the boat at rest, and right, at speed—38 m.p.h., all out. She is similar to present stock 16 footers. Her name is "Scram."

Andy's Shop Mail Box

This month Andy growls about gents who build things from plans and kick when their changes go haywire. There's a moral here if you are working on a project now!

GENERALLY I can't write a column that's worth a hang unless I get sore as a boil. And right now my temperature is 2256½ Centigrade, or Fahrenheit, or Darnright, or whatever it is.

This month's pet gripe is about gents who build things from plans that are run in this monkey's almanac, and then "just change them a little"—just a little, just a "little"! Just enough to make a flop out of the whole thing, of course, and then the designer, who is not only **not** to blame, but should never have such sacrileges inflicted on the results of his well thought out schemes, is called a dub and the magazine a punk proposition. Roughly speaking, it's the nuts. And am I going to air some scandal!!!! I've gone out of my way to collect dope for this gripe.

I hope to set an all time all Olympic howling record that will make men think twice before they alter these plans we run, and particularly the plans of boats.

A. P. Scoullar's impression of himself single-handing it in "Buddy," Sam Rabl's famous tabloid cruiser design.

So we'll start out with the words of Bill Crosby, who edits that grand old boating magazine, the Rudder. Bill and Westy Farmer were comparing notes the other day about the subject. Bill writes:

> **Regarding amateur boat builders and the way they change plans to suit themselves, the situation has just about made an old man out of me. Of all the fool things that they do, their favorite thing is to change plans back and forth until they are not anything like the original boat. I had one fellow send in a photo of just about the worst looking boat that I had ever seen, claiming that it was one of my designs that had appeared in Rudder. Investigation proved that he made the boat considerably longer, had increased the beam, changed the draft and had added a cabin with full headroom on what was supposed to be a small fast runabout. Only the other day some sap kicked because his boat would not plane properly when built according to our plans, and I checked up and found that the boat was 19½ feet long when it was supposed to be 17 feet and instead of using a vee drive he had placed the engine amidships, using a regular shaft and orthodox rig. Needless to say, I made a few appropriate remarks on the subject.**

* * *

It's guys who build things that way who make it hard for guys like us.

* * *

Most fellows are chary about changing an airplane design, being content to feel that the designer knows more about the quirks and ways of the unseen medium than the embryo does.

But for some strange reason, when it comes to boats, any man seems to feel he knows more about how a boat should be built than the skilled, experienced designer who made the plans.

One man increases the headroom "so I can stand up" and then wonders whynell his boat

(Continued on page 14)

Business Demands Accountancy

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ACCOUNTANTS have been in demand—at far better than average earnings.

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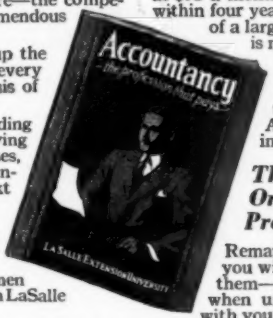

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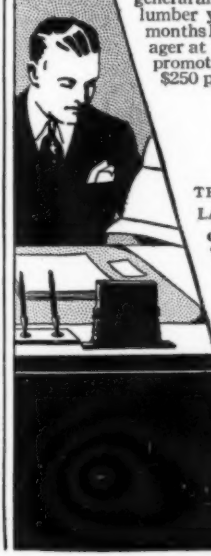

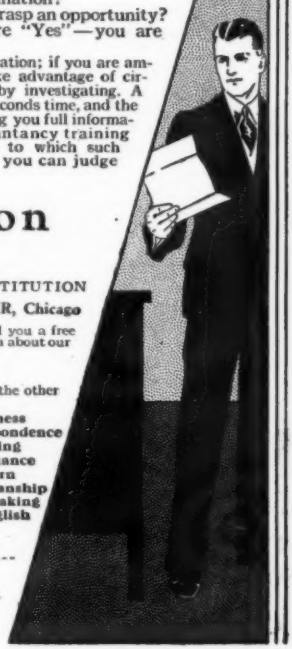

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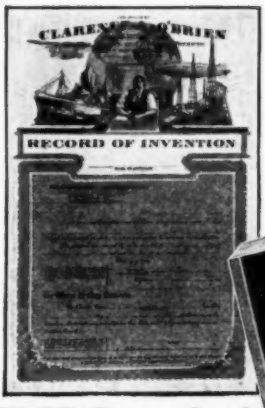

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TENTS

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"He was trying to figure out a way to speed up the machines. He was stumped and I asked him if he would let me try my hand.

"'Go ahead,' he said, 'but I don't believe you can help much. Looks like an outside job to me.'

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"'How did you learn all that?' he asked in that quiet way of his. And then I told him I'd been studying at home nights through the International Correspondence Schools.

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ANDY'S SHOP MAIL BOX

(Continued from page 10)

blows all over a forty-acre lot when a little breeze blows along. And why the landlubbers, who after all have an unconscious sense of the fitness of things (born out of their ignorance), seem to always razz the looks of the tub.

Another man builds a small water scooter of the air propelled variety and sez, when he powers her with an ancient auto engine, that the designer must have made a mistake because the boat tips over every time the engine starts up.

Ho hum! Any high school kid could tell you that a boat or a plane is a compromise of finely balanced elements and that to change one throws all the rest out with a big WHACK, and the whole thing loses its original identity.

I asked Farmer about it the other day and he left this pencilled note on my spindle.

I wouldn't change as much as the color of the paint on any other man's design, Andy, and here's the reason: I know when I do a design that the job is a combination of ingredients calculated to make the boat behave in just the most desirable way possible. Those things don't show on paper. I repeat, those things don't show on paper. You can's see em in the plans. The thing to do is to leave the designer's work alone, follow it as closely as you can. Any guy who is on to naval architecture and who has done much of the how-to-build kind of design will specify just about how much leeway you can have in minor alterations. Me, I'd not even change the paint.

There you have the opinion of two editors, both of them experienced small boat designers. Stick to it like glue!

* * *

Still speaking of boats, here's a letter from Gulfport, Fla. A. P. Scoullar is a good cartoonist, and he illustrates at the head of his letter how he would appear at the helm of his "Buddy"—the tabloid cruiser for which plans are now running in the No. 3 issue of the Mechanical Package Magazine.

M. M. I. Pub. Co.
Gentlemen:

In your July, '32, issue, page 178, I find an illustration of Buddy—18-ft. single hander. Have you any pamphlet or drawing I can get which shows more clearly Buddy's qualifications, beam, depth, cabin head room, etc., etc.

The drawing on page 178 is too small to give one the proper idea of the boat.

An answer will be greatly appreciated.

We have fine cruising water here, and as I am like many others, Hooverizing so to speak, I have plenty of time to build and sail Buddy.

Single handed appeals to me. Have sailed some, and some more would suit me.

Respectfully,
A. P. SCOULLAR.

Incidentally, every boat lover, whether he ever intends to build one or not, should have a copy of issue No. 3 of our brother mag, the Mechanical Package Magazine. This issue contains the full how-to-build design article on "Buddy" and we

(Continued on page 16)

A father's slant ON AVIATION SCHOOLS

The statement quoted here was made by Mr. E. J. Burck of Jackson, Michigan, whose son lately enrolled in Parks Air College. It is used with his permission.

"I'M leaving here with the conviction that Parks Air College is the right school for the boy who realizes that the big things in air-transportation call for more than flying or mechanical ability.

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"Knowing my son as I do, I'm confident that he'll graduate from Parks with a man's point of view on the responsibilities of life—with a man's attitude toward the people he works for and the people he works with. And I'll be badly fooled if he doesn't turn out to be an A No. 1 transport pilot who'll some day fill a big job in air-transportation."

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Note: Of course, if you prefer, you may enclose $2 with the coupon, and the books will be sent to you with the same guarantee and the same promise of an immediate refund.

American Technical Society, Dept. A-7320, Drexel Ave. at 58th St., Chicago.

You may send me the 6 big money-making books on automobile engineering, latest edition, with the understanding that I will deposit $2 on delivery, which deposit is to be immediately returned to me if I return the books within 10 days, at your expense. If I decide to keep them, I will send you $3 in 30 days and then $3 a month until the special low price of only $24.80 is paid. Note: If you are enclosing $2 please check here...

Name .....

Address .....

City ..... State.....

ANDY'S SHOP MAIL BOX

(Continued from page 14)

are reliably informed by our circulation department that the Pack Mag is virtually a sell-out for the third succeeding time, already selling as many copies as good old M-M.

Which means that if you want to get the plans for "Buddy" at all, and if your newsstand is sold out of Pack Mags, thirty-five centimes to our circulation department will possibly catch one of the few hundred reserved copies we have on hand for mail orders.

The extra dime, by the way, is for the carton and the added mailing costs.

Kenneth David of Norwalk, Ohio, has run this three wheeler for two years on all kinds of roads and reports the three wheel idea just the thing for eliminating differential problems.

The light car fans are at it heavy and strong. Glimpse herewith Kenneth David's three wheeler, of which he says:

Dear Andy:

I am sending you a letter that I received from Modern Mechanix in April. Though I have been tardy in replying, still I hope that you can find room in your column for at least one photo and a description of my midget car.

In my opinion this type of midget car can't be beaten for good performance and rugged reliability. I have driven this little car for two years, over all sorts of roads, summer and winter, and it's still in good shape. It will do forty m.p.h. with its one-lung Harley motor. It will climb hills remarkably well. The one back wheel easily solves the differential problems that amateur car-makers run up against. The car was built for less than twenty dollars.

I think that Modern Mechanix is the best mechanical magazine. Just now I am about ready to start building the V bottomed catboat described in your July issue.

You may use any parts of this letter and the facts given or change it to suit yourself. I am sending another photo in hopes you will want a front view.

Cordially yours,
KENNETH DAVID.

Here is a guy going strong for cars as this Kenneth David, and yet the catboat fever has struck him, too. But here again is a letter from Bill Baggerman who wants us to toss out light-plane stuff and run some race car stuff. His letter:

Dear Andy:

How about a little "dope" on race cars?

(Continued on page 18)

Give me your measure and I'll *PROVE* You Can Have a Body like Mine!

NOTE: No other Physical Instructor in the World has ever DARED make such an offer!

I'LL give you PROOF in 7 DAYS that I can turn you, too, into a man of might and muscle. Let me prove that I can put layers of smooth, supple, powerful muscles all over your body.

If you are underweight I'll add the pounds where they are needed and, if you are fat in any spots, I'll show you how to pare down to fighting trim.

And with the big muscles and powerful, evenly-developed body that my method so quickly gives you, I'll also give you through-and-through health—health that digs down into your system and banishes such things as constipation, pimples, skin blotches and the hundred-and-one other conditions that rob you of the good times and the good things of life.

Here's All You Do!

Just jot down your name and address on the coupon below, mail it to me—and I'll send you, absolutely free, a copy of my new book, **"Everlasting Health and Strength."** It reveals the secrets that changed me from a 97-pound, flat-chested weakling into a husky fellow who won the title of **"The World's Most Perfectly Developed Man"** against all comers! And it shows how I can build you into an **"Atlas Champion"** the same easy way.

I haven't any use for apparatus that may strain your heart and other vital organs. I don't dose you or doctor you. **Dynamic-Tension** is all I need. It's the natural, tested method for developing real men inside and out. It distributes added pounds of powerful muscles over your body, gets rid of surplus fat, and gives you the vitality, strength and pep that win you the admiration of every woman and the respect of any man.

Charles Atlas

Holder of the title:

"The World's Most Perfectly Developed Man"—won in international contest against ALL strong men willing to compete with him.

CHARLES ATLAS As He Is Today.

Gamble a Stamp—To Prove I Can Make YOU a New Man!

Gamble a stamp today by mailing the coupon for a free copy of my book, **"Everlasting Health and Strength."** It tells you all about my special **Dynamic-Tension** method, and what it has done to make big-muscled men out of run-down specimens. It shows you, from actual photos, how I have developed my pupils to the same perfectly balanced proportions of my own physique, by my own secret methods. What my system did for me, and these hundred of others it can do for you too. Don't keep on being only 25 or 50 per cent of the man you can be! Find out what I can do for you.

Where shall I send your copy of **"Everlasting Health and Strength"?** Jot your name and address down on the coupon, and mail it today. CHARLES ATLAS, Dept. 6-Z, 133 East 23rd Street, New York City.

CHARLES ATLAS, Dept. 6-Z, 133 East 23rd Street, New York City.

I want the proof that your system of **Dynamic-Tension** will make a New Man of me—give me a healthy, husky body and big muscle development. Send me your free book, **"Everlasting Health and Strength."**

Name.....
(Please print or write plainly)

Address.....

City.....State.....

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In the Great Shops of COYNE

Don't spend your life slaving away in some dull, hopeless job! Don't be satisfied to work for a mere $20 or $30 a week. Let me show you how to make REAL MONEY in RADIO—THE FASTEST-GROWING, BIGGEST MONEY-MAKING GAME ON EARTH!

JOBS LEADING TO SALARIES OF $50 A WEEK AND UP

Prepare for jobs as Designer, Inspector and Tester—as Radio Salesman and in Service and Installation—as Operator or Manager of a Broadcasting Station—as Wireless Operator on a Ship or Airplane—as a Talking Picture or Sound Expert—HUNDREDS of Opportunities for fascinating, BIG PAY JOBS!

10 WEEKS' SHOP TRAINING AT COYNE IN CHICAGO

I don't teach by book study. We teach you by ACTUAL WORK on a great outlay of Radio, Broadcasting, Television, Talking Picture and Code equipment. And because we cut out useless theory, you get a practical training in 10 weeks.

TELEVISION IS NOW HERE

And TELEVISION is already here! Soon there'll be a demand for TELEVISION EXPERTS! The man who gets in on the ground-floor of Television can have dozens of opportunities in this new field! Learn Television at COYNE on the very latest Television equipment.

TALKING PICTURES

A Big Field for Trained Men

Talking Pictures, and Public Address Systems offer golden opportunities to the Trained Radio Man. Learn at COYNE on actual Talking Picture and Sound Reproduction equipment.

EARN AS YOU LEARN

You get Free Employment Service for Life. And if you need part-time work while at school to help pay expenses, I'll help you get it if you will tell me your problems. Coyne is 32 years old. Coyne Training is tested—You can find out everything absolutely free. JUST MAIL the Coupon for My BIG FREE BOOK.

Radio Div., COYNE Electrical School

500 S. PAULINA ST., Dept. 72-1H, CHICAGO, ILL.

H. C. LEWIS, President
Radio Division, Coyne Electrical School
500 S. Paulina St., Dept. 72-1H, Chicago, Ill.

Dear Mr. Lewis: Send me your Big Free Radio Book and all details of your Special Introductory Offer. This does not obligate me in any way.

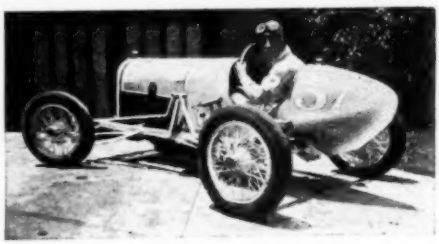
Name.....

Address.....

City.....*State*.....

ANDY'S SHOP MAIL BOX

(Continued from page 16)



Here's a sweet looking little cart that was designed by the same man who designed and builds the little Cleone two-cycle airplane plants. His name is Bill Allen. Wm. Baggerman sent the photo.

You seem to have forgotten them lately. Inclosed is a picture of a pretty speedy little bus we built for $175. Its designer is none other than Bill Allen, the fellow who designed and builds the little Cleone lightplane motor.

In the future why not toss out some of the light plane news and give some of us race car "bugs" a chance.

Yours truly,
WM. BAGGERMAN.

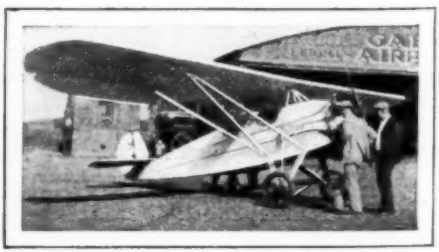
One of the sweetest lightplane jobs we have seen is the one built by O'Bannon Bros. Here's their letter, which it gives me pleasure to run.

Oak Park, Illinois.

Dear Andy:

Well, here it is, home brew No. 2. With bugs worked out and everything, after two years of building, testing, tearing down, building, testing, etc. She is complete and to our complete satisfaction and does it get off, climb and fly! It has the same speed as a Great Lakes at the same r.p.m., but gets off quicker and climbs faster than the Lakes and will cruise with full load of gas and two 165-lb. men at 1500 r.p.m., and lands about 35 miles per hour.

She is powered with a 90-horse Lambert engine and has a wing spread of 33 ft., and a 5-ft. cord and is 20 ft. long.



The new O'Bannon job powered with a Lambert is as sweet a home product as we have seen turned out by any of our readers. Congrats, boys. A dandy job!

(Continued on page 20)

Who else wants to learn to play....

at home without a teacher, in ½ the usual time and ⅓ the usual cost?

Over 600,000 men and women have learned to play their favorite instruments the U. S. School of Music way!

That's a record of which we're mighty proud! A record that proves, better than any words, how *thorough*, how *easy*, how *modern* this famous method is.

Just think! You can quickly learn to play any instrument—directly from the notes—and at an average cost of only a few cents a day.

You study in your own home, practice as much or as little as you please. Yet almost before you realize it you are playing real tunes and melodies — not dull scales, as with old-fashioned methods.

Like Playing a Game

The lessons come to you by mail. They consist of complete printed instructions, diagrams, and all the music you need. You simply can't go wrong. First you are *told* what to do. Then a picture *shows* you how to do it. Then you do it yourself and *hear* it. No private teacher could make it any clearer.

As the lessons continue they become easier and easier. For instead of just scales you learn to play by *actual notes* the favorites that formerly you've only *listened* to. You can't imagine what fun it is, until you've started!

Truly, the U. S. School method has removed all the difficulty, boredom, and extravagance from music lessons.

Pick Your Instrument	
Piano	Violin
Organ	Clarinet
Ukulele	Flute
Cornet	Saxophone
Trombone	Harp
Piccolo	Mandolin
Guitar	'Cello
Hawaiian Steel Guitar	
Sight Singing	
Piano Accordion	
Italian and German Accordion	
Voice and Speech Culture	
Harmony and Composition	
Drums and Traps	
Automatic Finger Control	
Banjo (Plectrum, 5-String or Tenor)	
Juniors' Piano Course	

Fun—Popularity

You'll never know what real fun and good times are until you've learned to play some musical instrument. For music is a joy-building tonic—a sure cure for the "blues." If you can play, you are always in demand, sought after, sure of a good time. Many invitations come to you. Amateur orchestras offer you wonderful afternoons and evenings. And you meet the kind of people you have always wanted to know.

Never before have you had such a chance as this to become a musician—a really good player on your favorite instrument—without the deadly drudging and prohibitive expense that were such drawbacks before. At last you can start right in and *get somewhere*, quickly, cheaply, thoroughly.

Here's Proof!

"I am making excellent progress on the 'cello—*and owe it all to your easy lessons,*" writes George C. Lauer of Belfast, Maine.

"I am now on my 12th lesson and can already play simple pieces," says Ethel Harnishfeger, Fort Wayne, Ind. *"I knew nothing about music when I started."*

"I have completed only 20 lessons and *can play almost any kind of music I wish.* My friends are astonished," writes Turner B. Blake, of Harrisburg, Ill.

And C. C. Mittlestadt, of Mora, Minn., says, "I have been playing in the brass band for several months now. I learned to play from your *easy lessons.*"

You, too, can learn to master the piano, violin, 'cello, saxophone—any instrument you prefer—this quick, easy way! For every single thing you need to know is explained in detail. And the explanation is always *practical.* Little theory—plenty of *accomplishment.* That's why students of the U. S. School course get ahead *twice as fast* as those who study by old-fashioned, plodding methods.

Booklet and Demonstration Lesson—FREE!

The whole interesting story about the U. S. School course cannot be told on this page. A booklet has been printed, "How You Can Master Music in Your Own Home," that explains this famous method in detail, and is yours free for the asking. With it will be sent a Free Demonstration Lesson, which *proves* how delightfully quick and easy—how *thorough*—this modern method is.

If you really want to learn to play at home—without a teacher—in one-half the usual time—and at one-third the usual cost—by all means send for the Free Booklet and Free Demonstration Lesson AT ONCE. No obligation. (Instruments supplied if desired—cash or credit.) U. S. SCHOOL OF MUSIC, 26210 Brunswick Bldg., New York.

Thirty-Fourth Year (Estab. 1898)

U. S. SCHOOL OF MUSIC,
26210 Brunswick Bldg., New York City.

Please send me your free book, "How You Can Master Music in Your Own Home," with inspiring message by Dr. Frank Crane, Free Demonstration Lesson and particulars of your easy payment plan. I am interested in the following course:

Have You
.....Instrument? .....

Name .....

Address .....

City ..... State.....

Build it Yourself

You've always wanted one and now Heath makes it easy. You can take advantage of your leisure time to build your own ship. With Heath parts your home assembled plane will be eligible for a Department of Commerce License.

Twenty-three years' experience in building light planes and in working with those who like to build their own ship has resulted in the new approved model LN Heath and the New Assembly Kit.

SOON READY TO FLY

Your part of the building is simple, the hard work is all done at the factory with special equipment. The fuselage, tail, rudder and stabilizer come completely welded. Construction is of strong steel tubing. All you have to do is assemble the ready built parts, cover and paint your plane. You'll be surprised to find how easy it is to build your Heath. All holes are drilled. Simple tools and two or three weeks' work will complete your ship ready to fly. Simple instructions make assembly easy.

ALL CAN AFFORD

By using your own labor you can have a Heath for only $399.00. The parts can be shipped as desired. The first shipment coming for only $16.00. Balance may be ordered as desired and paid for as shipped. Model L.N. may be licensed with Heath B4 Motor, $300.00 or Continental A40, $450.00.

FLYAWAY SHIPS

For those who prefer, Model L.N. B-4 can be had, Flyaway, Niles, Michigan, $1,074.00 (ship as shown with B4 Motor). Powered with Continental A40, $1,224.00.

FOR FLYING CLUBS OR SCHOOLS

Heath has worked out a most attractive rental plan to place a ready to fly model L.N. on the field of any responsible club or school. On this plan ship will pay for itself and give you a profit. Low initial and maintenance cost makes the Heath ideal for this purpose.

Write, asking for details on this club plan.

Heaths have won their events in the National Air Races for the past six years. Heaths also hold the world's altitude record for light planes, 17,907 feet. Truly championship performers!

Flying speed 75 to 85 m.p.h. Takes off and lands in small space.

Send 15c for complete literature and details will be forwarded promptly.

HEATH AIRCRAFT

HEATH AIRCRAFT CORPORATION,
Dept. M210, Niles, Mich.
I am enclosing 15c for your booklet describing: (check which desired)
( ) Assembly Kit ( ) Flyaway Ship

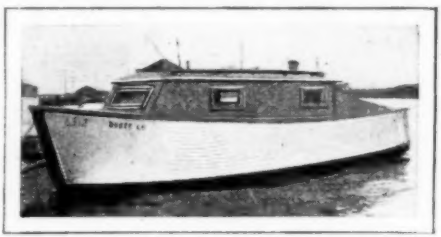
*Name*_____

*Address*_____

*City*_____ *State*_____

ANDY'S SHOP MAIL BOX

(Continued from page 18)



The changed cabin and stem may not seem like Gannet, but here is one of these famous hulls built from Charley Hall's plans in M-M. Lutz & Rhodes of San Jose, Cal., built her.

Will give you more dope later if you wish and will answer any questions from any of the boys regarding the crate.

And so until M. M. is on the stand,

Happy landings,
O'BANNON BROS.

Any questions concerning the O'Bannon job can be addressed direct to them at Oak Park.

* * *

Back again to the boats, and—well, I'll let the letter tell all:

San Jose, Calif.

Dear Andy:

Enclosed are some snapshots of our completed efforts at building the cruiser "Gannet," built entirely from the Modern Mechanix blueprints.

We used a 1927 Chev. motor, turning a 14x12 propeller, for power, and are able to get between 9 and 10 miles per hour. We find the boat is underpowered with this motor, and would advise a more powerful motor to future builders.

We made no changes in plans except for a windshield in front and a slanting cabin front. We find the windshield a very useful addition.

The entire cost was $207 including the motor, which, we feel, is a lot of boat for the money.

Here's for more boat news,

MALCOLM LUTZ
DICK RHODES

The wind boat is always with us! Here is the Oklahoma version as interpreted by Dick Bennett, of Guthrie, Oklahoma.

(Continued on page 22)

The Season's Big Radio Sensation!

16-TUBE ALL-WAVE only $39.95

Completely Assembled with Large DUAL SPEAKERS

All The NEW 1932 FEATURES

30 DAYS FREE TRIAL

WHAT a radio! One complete 16-tube chassis with one dual-ratio dial—new Super-Heterodyne circuit with a range of 15 TO 550 METERS... No plug-in coils... No trimmers... Large acoustically matched Dual Speakers ... New CLASS "B" PUSH-PUSH Super Power Amplifier with six times the power of ordinary tubes... Full band AUTOMATIC VOLUME CONTROL... COLOR-LITE Multi-Wave Band Selector... STAT-OMIT TUNING SILENCER... Full FLOATING VARIABLE CONDENSER... Complete Scientific Shielding... Absolute tone fidelity... Image Frequency Suppressor... Fractional Microvolt Sensitivity... 18-TUNED CIRCUITS... ALL NEW TYPE TUBES, SUPER TRIODES, DUAL and TRIPLE GRIDS, Two Full Wave Rectifiers, including the new Mercury type. DUAL POWERED—two separate power transformers. A bigger, better, more powerful, more selective, finer toned radio than you've ever seen before... offered at an amazingly low price direct from the big Midwest factory. Midwest engineers have far outdistanced all past performances in perfecting this new set.

COMPLETE LINE OF CONSOLES

The big new Midwest catalog shows gorgeous line of artistic consoles in the new six-leg designs. Mail the coupon now. Get all the facts. Learn how you can save 20% to 50% on a big powerful radio by ordering direct from the factory.

BATTERY RADIOS

Using the New AIR CELL BATTERY

Two sensational values: a 6-tube super-het for standard-wave reception and a 9-tube ALL-WAVE, both using the new AIR CELL "A" battery that never needs recharging. Low factory prices. Coupon brings details. Mail it NOW!

Deal Direct with Factory SAVE UP TO 50%

Don't be satisfied with less than a Midwest 16-tube A.C. radio. A receiver covering only the regular broadcast waves is **only half a set.** Improvements in short-wave programs have made ordinary broadcast sets obsolete. The Midwest gives you regular, foreign, police and amateur broadcasts in one single dial set. No converter or any extra units required.

Investigate! Mail the coupon. Get the Midwest catalog. Learn the facts about Midwest 9, 12 and 16-tube ALL-WAVE sets. Learn about our sensationally low factory prices, easy payment plan and positive guarantee of satisfaction or money back.

TERMS as low as $5 DOWN

Read This!

Just one of **thousands** of letters praising Midwest Radios.

GETS FRANCE, SPAIN, ITALY, JAPAN

"Have received foreign short-wave stations such as FYA, France; EAQ, Madrid, Spain; 12 RO, Rome, Italy; and last but not least, JIAA, Tokyo, Japan. I really think the Midwest set is a miracle." A. F. GRIDLEY, Sarasota, Fla.

Don't buy any radio until you get the big new Midwest catalog. Just sign and mail the coupon or send name and address on a postal.

Remember, you buy DIRECT FROM THE MAKERS. No middlemen's profits to pay. You get an absolute guarantee of satisfaction or money back. You try any Midwest 30 DAYS before you decide to keep it. Then, if you wish, you can pay in small monthly amounts that you'll scarcely miss. Mail coupon for full details or write us a postal.

RUSH THIS COUPON FOR AMAZING FREE TRIAL OFFER AND BIG BEAUTIFUL CATALOG

Without obligation on my part send me your new 1932 catalog, and complete details of your liberal 30-day free trial offer. This is NOT an order.

Midwest Radio Corp., Dept. 116, Cincinnati, Ohio.

Name.....

Address.....

Town..... State.....

USER AGENTS Easy EXTRA MONEY! Check here for details. ☐

MIDWEST RADIO CORP.

Dept. 116 **(Est. 1920)** **CINCINNATI, O.**

WANT A STEADY GOVERNMENT JOB?

PICK YOUR JOB

Many Positions: Railway Postal Clerks, City Mail Carriers, Rural Carriers, City Postal Clerks, Clerk in Government Offices, Customs Inspectors, Stenographer-Typist, Immigrant Inspectors

$1260 to $3400 a YEAR

MEN—WOMEN 18 to 50

Short Hours Pleasant Work

Rapid Advancement

Steady Work—No Lay-offs

Thousands Post Depression Jobs

Mail Coupon Now—Act at Once

Do It Today—Tomorrow May Be Too Late!

Get Here

FRANKLIN INSTITUTE,
Dept. A-307, Rochester, N. Y.

Rush to me, free of charge, 32-page book, "How to Get a Steady U. S. Government Job," with (1) A full description of the position checked below; (2) A list of U. S. Government Jobs now obtainable; (3) Tell me how to get the job checked.

....Railway Postal Clerk.....($1900-$2700)
....Post Office Clerk.....($1700-$2300)
....City Mail Carrier.....($1700-$2100)
....Rural Mail Carrier.....($2100-$3400)
....Clerk in Government Offices.....($1260-$2500)
....Inspector of Customs.....($2100-$3300)
....Stenographer-Typist.....($1260-$2500)
....Immigrant Inspector.....($2100-$3000)

Name.....

Address.....

Use This Coupon Before You Mislay It—WRITE OR PRINT PLAINLY

ANDY'S SHOP MAIL BOX

(Continued from page 20)

Richard Bennett of Guthrie, Oklahoma, built himself a wind boat. This job was inspired by designs and data published in M-M. Here's his letter, with photo attenuated.

Guthrie, Okla.

Dear Andy:

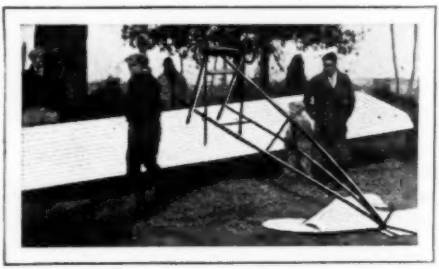
Being a constant reader of Modern Mechanix Mag. and the Shop Mail Box, I am sending you a picture of a wind boat built by Harold Hall and myself. It is driven by a Harley Davidson 74 engine, converted by us, the prop hub and shaft are two pieces of T model transmission shaft with the flange ends bolted together with an adjustable thrust bearing built on. The prop is 4½-foot, home-made. We use a pressure gas tank in the bottom of the boat.

Our only available water being too shallow to use a water rudder we had to use an air rudder which turns it quickly in a small radius. This boat makes about 15 miles per hour. If any of the Gang are interested in this kind of stuff we will be glad to hear from them. We are also interested in lightplane building.

Sincerely,
RICHARD BENNETT.

* * *

Although the fervid interest in gliding seems to have died down, due to a combination of Depression, broken noses and the h. c. of leg work, Bill Eichbaum, of Chattanooga, Tenn., sends us the dope on his upside down Duede glider.



The old Duede Glider pops up again—this time it is the ship built by Bill Eichbaum, of Chattanooga. A wind has just flipped her on her back.

Chattanooga, Tenn.

Dear Andy:

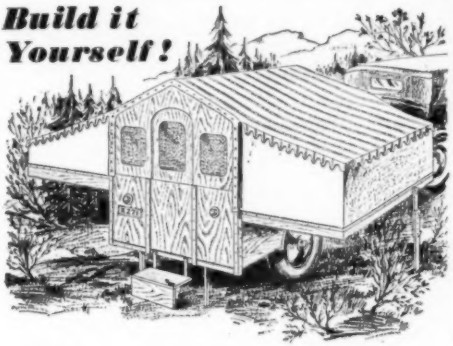
I have been reading M. M. for a long time and think it is the best magazine of its kind. Although I know nothing at all about aircraft, I built the Duede glider from plans published in an early issue. The glider looked rather frail to me, but it proved to be very strong for its weight. One time a strong wind picked it up and deposited it upside down against a tree with no damage done except a broken rudder post and stabilizer. This was repaired later and I had a lot of fun with it. I would like to see more model building articles in M. M., and radio sets.

(Continued on page 26)

Bungalow Trailer

A House on Wheels

Build it Yourself!



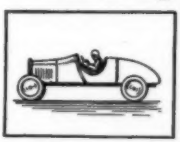
JUST the thing for this summer's vacation—a house on wheels in which four or five members of the family can sleep in comfort, with all household equipment self-contained, running water, built-in beds.

Best of all, when traveling the trailer is folded together compactly so that it occupies no more space than a conventional trailer. The illustration above shows the outfit in camp, ready for the night. Bed-springs are contained in the side-balconies which project out over the wheels.

Chassis of the trailer is built up out of a front-axle unit from an old car—almost any type will do. Cost of construction is kept at an absolute minimum; no elaborate tool outlay is required.

Blueprints giving details of construction are large size, easy to understand, all dimensions plainly shown. Scores of these trailers have been built with complete satisfaction to their owners. Price of blueprints, postpaid **$1.00**

Ford Speedster Body



Racing body for a Model T Ford or similar chassis. The simple wooden frame is covered with chicken wire, a layer of cotton batting placed over it, and the whole held down with a covering of Fabrikoid, or imitation leather, which makes the job look like one of those custom-built imported French models. Choose any color combination you like. This body has a streamlined tail like the big-time speedway racers. Hammer and saw and a few small tools are all that are needed to construct it. Looks like a million dollars, but can be built at an insignificant cost.

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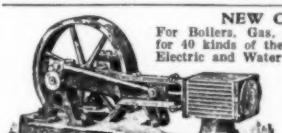

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HOWARD RACER **$1**

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Name .....

Address .....

Use This Coupon Before You Mislay It

ANDY'S SHOP MAIL BOX

(Continued from page 22)

I am sending several snapshots of the glider together with some models I built.

Yours truly,
WILLIAM EICHBAUM.

P. S.—Would like to hear from anybody who has built the Northrop training glider.

* * *

Say, what do youse guys think about a good boat book?

Write and tell me what you'd like to see in just such a publication. Something which would contain a lot of new plans as well as the old favorites like Gannet, Wanderboat, Dorothy, Punkin Seed and others.

The way to do the thing is this:

Sit down and ask yourself all of the things you'd like to know about how to build a boat. Then tack on what you think ought to be a well rounded set of designs, and who they should be designed by.

I'll get bizzy organizing and we'll soon have the nicest little big book of what to do about boats you ever saw. And I want it to be edited by you, mistah, and you and you, old salt!

Oil up that pencil, and tell me if you'd like sech a sheet. Do it now.

Here's a chance to once and forever air your views on what ought to comprise a real boat manual—something intelligent and not a b c elementary.

* * *

Well, suffer some more, you dry land ginks, and rejoice also, ye sailors, because this month being summer finds my desk and spindle all loaded with swell pix of what readers have actually done in the line of boat building.

So I'm running them.

Pretty soon it will be turn for the ice sleds and the new crop of models, so while the spirit is in the air—on with the boats!

* * *

Up on the limitless north shore—the very very north Canadian shore of Lake Superior, at Raith, Ont., Paul Dubec has built a "Tubby" from the Rabl design published in May M-M & I. This boat, you'll remember, was a simple little twelve-foot sailing scow which the Baltimore sage did for us. Reports of satisfactory usage of this boat have filtered in to this doddering old ink slinger from time to time and without fail the boys all report success. Last issue you'll remember a chap out in Denver who built one.

This little wagon is "Tubby," a Rabl design built in Ontario, by Paul Dubec, of Raith.

(Continued on page 30)

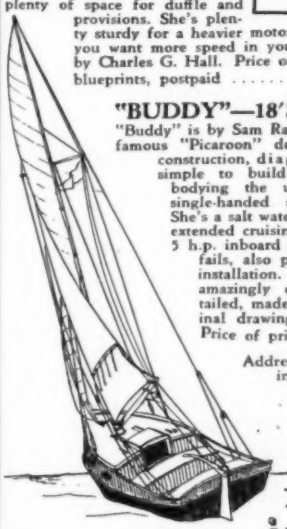
Sail Your Own Boat this Summer!

"DOROTHY," shown above, is a deservedly popular boat for those who want a 24-footer with sail and auxiliary motor. Two sail plans shown on blueprints, one of larger area than that above. A 10 h.p. motor is adequate for her. Plenty of cabin head room; a real deep water performer. Designed by John G. Hanna. Bunks for two. Drawings give dimensions of parts so you can scale them off for full-size patterns. Nearly a hundred "Dorothys" are being built right now. Price of blueprints, postpaid.... **$2.50**

"GANNET"—Ford-Powered Cruiser

This 24-foot cruiser is powered with a Model T Ford motor, converted to marine use. She'll do around 15 m.p.h. with this power plant. Uses V-bottom hull, easy for amateur construction, since no steaming of planks is necessary. Bunks for two; plenty of space for duffle and provisions. She's plenty sturdy for a heavier motor than the Ford, if you want more speed in your craft. Designed by Charles G. Hall. Price of blueprints, postpaid **$2.00**

"BUDDY"—18′ Single-hander



"Buddy" is by Sam Rabl, a sequel to his famous "Picaroon" design. Chesapeake construction, diagonal planking, simple to build throughout, embodying the ultimate in small single-handed sailing cruisers. She's a salt water boat suitable for extended cruising for two. Has a 5 h.p. inboard motor if the wind fails, also provision for radio installation. Blueprints are amazingly complete and detailed, made from Rabl's original drawings. Price of prints.. **$4.00**

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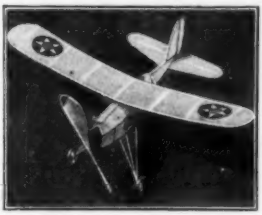

Big, Sling-Shot Glider given **FREE with each** "build-it" plane ordered from ad. Loops, stunts. Fun galore! Read each word of this. Save money by ordering planes in groups. See below! ORDER!

DIPPER E-Z to Build—Flies 900 Ft.

Amazing Dipper costs only 50c postpaid, weighs ½ oz., takes off ground, flies 900 feet! Thousands built, flown! Mailed in big, yellow box. Glider included **FREE.** ORDER Now! **YOU GET ALL THIS:** Jap tissue, balsa ribs, formers, insignia, wheels, bamboo, special nosepiece, balsa "prop" block, cement, bana oil, all wire parts, rubber motor, full-size drawing, clear instructions. **Quick! Order!**

Span, 12½"; Length, 9¼"

50c Postpaid

Span, 14"; Length, 12"

"MY FLYING Scale HOWARD RACER Averages 750 Feet Per Flight!"—John Etherington

75c Postpaid

Many fly this Speed King farther. Man! This is the flying scale model that's EASY to build, looks real, yet costs only 75c postpaid! Sensational value. **Complete** "build-it" kit in big, color box (and FREE Glider) has **ALL** materials to build, fly. ORDER NOW!

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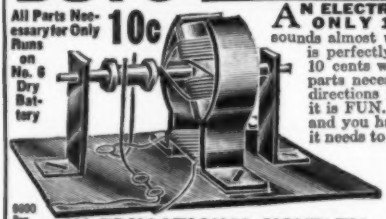
BOYS BUILD THIS ELECTRIC MOTOR 10c

All Parts Necessary for Only 10c Runs on No. 6 Dry Battery



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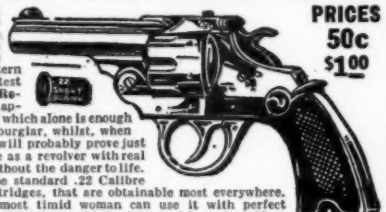

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If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

ANDY'S SHOP MAIL BOX

(Continued from page 26)

Raith, Ont.

Dear Andy:

Enclosed are two photos of my private yacht I've built from plans published in Modern Mechanix. My chum, George Kouhi, and I built her piece by piece and carried the parts four miles over a rough trail to the nearest sizeable lake. Worth the effort, though. She has made as much as eight miles per hour in a strong wind with a load of four persons.

She tacks quite well and is remarkably safe. We've been using her all summer in all kinds of weather. Once the wind was strong enough to break off the mast, but she suffered no other damage. In a dead calm she is very easy to row at a fair speed. We've rowed up and down shallow rivers; whenever we hit a spot too shallow or too rocky, we get out and push her over. She's a dandy all around boat.

One photo shows me sailing by in a light breeze. The other is a close-up of the boat. The sides are not cut down as shown in the plans; this is necessary because the boat heels over a lot in a strong wind and a light load. The two by six cross-piece for the mast is braced to take the strain off the sides which otherwise bend too much. The leeboards are pivoted to the sides of the boat with a bolt seven inches from the top. Both leeboards are down when sailing, and when a rock is hit the leeboards turn up on the pivots. We use the spreet sail only; the jib interferes with the performance of the mainsail.

So long, Andy, fair sailing to you and the magazine.

PAUL DUBEC.

P. S. You may publish this letter and photos if you wish to. P. D.

That's just what I'm doin', too, Paul. Any boat that gets caught out in a duster that dismasts her has had a lot of sailing, and any man who has done a lot of sailing is qualified to speak of the good points and the weak points of his job.

As designed, Tubby was well suited for most all waters. Up on the lakes, though, it either blows like Billy Bedam or it doesn't blow at all. Hence your remarks, Paul, on the strengthening of the hull are in order. The important thing is that you did all this afterwards—not before you knew what you were doing.

This point pertains to what I have said in the opening paragraphs of this encyclopedia of opinion.

(Continued on page 35)

For Sale A New Stomach

Odd as that sounds, it is virtually as true as though a new stomach were really bought and paid for—that's what thousands of former stomach sufferers tell us. If ULCERS, GAS, ACID STOMACH and INDIGESTION, caused by hyperacidity, have made you miserable for years, what would you do for a new stomach that made eating and living a pleasure again? Would you spend a 3c stamp? Write to Minneapolis Von Co., Dept. 340, Lafayette Bldg., Minneapolis, Minn., for full FREE information.

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BOATS

GANNET—Ford-Powered

A deservedly popular boat plan. A 24-foot cruiser, powered with Model T Ford motor, driving her at around 15 m.p.h. Uses V-bottom hull, easy for amateur builder. Straight sides easy to plank. Bunks for two; plenty of room for provisions and duffle. Price of prints **$2.00**

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Primarily a power boat, designed for cruising economy, not speed. Good for 9 miles an hour with a 10 h.p. marine motor. Ford can be used if desired. Dorothy has a sail if the motor quits. She's 24-foot, plenty of cabin room for two or more; a real deep-water performer. Prints **$2.50**

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A small outboard racer, extremely simple to build. Cleans up in B, C, and D classes everywhere. Strictly a speedboat—easily portable. Prints **$1.00**

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An outboard runabout and cabin cruiser in one, light enough to move on a trailer. Good for 32-35 m.p.h. with a large outboard motor. Canvas covering, which can be put in place in a jiffy, gives you a weather-tight cabin for overnight stops. Price of prints **$2.00**

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KATUSHA—A Cruiser

Here's a big little 19-foot cruiser with a big double bunk and stern cabin. You can build her for about $100. Ultra modern, with stern drive engine. About the right size to tow on a big trailer for parts unknown and real adventure. Price of prints **$2.00**

WINK—A Race Boat

Here's a 125 cu. in. race job, over a dozen of which have been built. It is really an inboard motored hydroplane in the outboard size class. Plenty of speed; 40 miles an hour, and not hard to build. Very pretty. Prints..... **$2.00**

TUBBY—A Sailing Scow

A 12-foot sailing scow, just the thing for boating fans looking for something simple to construct. Flat-bottomed, with leeboards—the acme of simplicity to build. Your choice of two sail plans—you can use her as a rowboat, too. Price of prints **$1.25**

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The simplest type for the amateur builder. Blueprints give all dimensions for a job you'll be proud of. Price of prints, postpaid **$1.00**

BUDDY—18 Ft. Single-hander

Designed by Sam Rabl, embodying the ultimate in small single-handed sailing cruisers. Accommodates two with comfort on long cruises. Has 5 h.p. inboard motor, also provision for radio installation. Blueprints are amazingly complete and detailed. Price of prints, postpaid **$4.00**

BOUNCER—A Fish Class Catboat

A 15-footer, designed by Warren Hastings Miller. He built his for less than $40, including sail. A fast racing catboat for lake and harbor sailing. Price of prints **$1.00**

OLYMPIC MONOTYPE—Centerboard Catboat

A 12-foot V-Bottom centerboard catboat, unsurpassed for light to medium weather sailing. Officially designed for Olympic games competition by Edson B. Schock—blueprints are from his original drawings and cost, postpaid **$3.00**

LIGHT AIRPLANES

PIETENPOL AIR CAMPER

The country's most popular home-built plane. Carries two passengers, powered with Model A Ford motor. High wing monoplane. Cost of construction, including motor, well under $500. Blueprints show both wood and steel tube fuselages, and give motor conversion details. Hundreds of these prints have been sold with complete satisfaction. Price of prints.... **$7.50**

PIETENPOL SKY SCOUT

A mate to the Air Camper. Single place, powered with Model T Ford motor. Cruising speed, around 75 m.p.h. The most satisfactory light plane with this type of motor. Price of blueprints **$4.00**

AUTOS—TRAILERS

CAMPING HOUSE-TRAILER

Just the thing for vacation-time—a trailer with beds and household equipment, with a collapsible canvas roof and sides which fold up when not in use. Four or more can sleep in her. Price of prints **$1.00**

M-M SPORT ROADSTER

Blueprints, with full instructions for building, on an amazingly snappy and inexpensive job. Uses a motorcycle engine for power, chain drive—capable of 65 miles an hour, and looks like a custom built factory job at one-tenth the price! Price of complete prints **$2.50**

FORD SPEEDSTER BODY

Racing body for a Model T Ford or similar chassis. Wooden frame covered with chicken wire, then a layer of cotton batting held down by Fabrikoid (imitation leather) covering, makes this a ritzy-looking streamlined job. Costs but a few dollars to build. Price of blueprints..... **$1.00**

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COMPLETE RADIO STATION

Transmitting and receiving station both shown in blueprints—ideal 5-meter radiophone ... your upstairs room, with which you can talk with fellow radio fans around town. Complete blueprints **$2.00**

SHORT WAVE RADIO CONVERTER

With this converter you can hear short-wave programs from amazing distances on your own radio set. Inexpensive to build—blueprints give full instructions as well as diagrams. Price of prints **$1.00**

ROWING MACHINE

An ideal form of exercising machine that has won wide favor with readers; easily constructed from odds and ends. Price of blueprints **25c**

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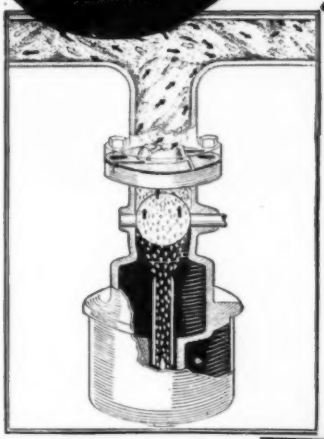
51 MILES ON A GALLON of GASOLINE WINS ECONOMY CONTEST

49 MILES Takes 2nd Place

Winning Cars Equipped With WHIRLWIND GAS SAVERS



Automobile owners who have been worrying about gasoline expense will be interested in an amazing test recently conducted by a Texas Motor Car Company. Twenty-three cars were entered in a mileage economy test, the winning car running 51 miles on a gallon of gas, the second car 49 miles on a gallon. When official test records were published it was found the two winning cars were both equipped with Whirlwind gas savers.

"Peak" Contest Mileages

The amazing results obtained in this mileage contest are naturally greater than those obtained in ordinary driving. Careful throttling, most economical speeds—no traffic hold-ups—and no waste of power thru quick stops, help to bring about these "peak" mileages.

A Test On Your Car

More power, faster pick-up, less carbon, quicker starting, and increased mileage is what users say in telling of their experience with the Whirlwind. Every motorist owes it to himself to test the Whirlwind to prove the results on his own car.

Mrs. C. P. Blalock, contest winner

How Whirlwinds Save Gasoline

The principle of the Whirlwind is to slightly compress the partly vaporized gasoline as it passes thru the raised venturi. Extra air enters from four air inlets at such a tangent as to pick up the unvaporized gasoline particles, whirling them into action.

The turbulence created breaks them into a vaporized gas, giving better, smoother power, quicker starting, cutting gasoline waste and carbon formation.

FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck or tractor. It's actually less work than changing your oil or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you save.

GUARANTEE

No matter what kind of a car you have or how big a gas eater it is the Whirlwind will save you money. While we do not claim to produce 49 to 51 miles on ordinary driving, we do guarantee that the Whirlwind will save its cost within 30 days or the trial will cost you nothing. We invite you to test it at our risk. You are to be the sole judge.

Car owners all over the world are amazed at the results of their tests. "I have more speed, power, and increased mileage," writes Henry Bomberger. "Hills I used to take in second I now make in high." Anton Wetsch: "I wouldn't take the Whirlwind off my car for any money. I am certainly convinced." W. B. Fountain: "My mileage has increased greatly. My car has plenty of pick-up and starts like a whip."

SALESMEN AND DISTRIBUTORS WANTED
To Make Up To $100 A Week and More

Whirlwind men are making big profits taking care of local business for this fast selling device that car owners cannot afford to be without. Good territory is still open. Free sample offer to workers. Full particulars sent on request. Just check the coupon.

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FREE OFFER COUPON

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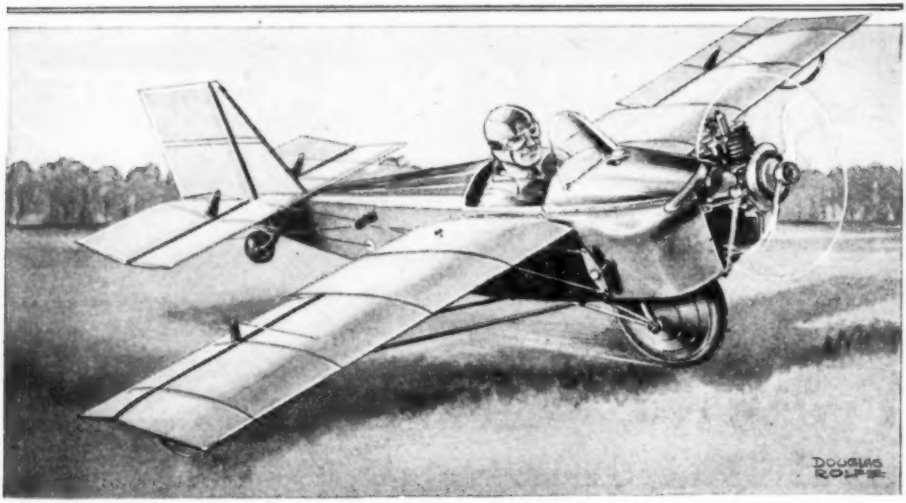
☐ Check here if you are interested in full or part time salesman position.



IT'S OUT - - The NEW 1932 EDITION of the

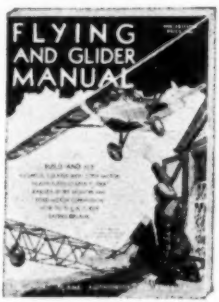
Flying and Glider Manual

YOU'VE been waiting patiently for it for months—and here it is, bigger and better than ever—by long odds the most up-to-the-minute and practically valuable edition of the Flying and Glider Manual ever published. The Penguin Practice Plane, shown at the top of this page, teaches the art of flying and supplies most of the thrills without leaving the ground. Plans for it appear complete in the 1932 Manual, as well as plans for a Ford-Powered monoplane carrying two passengers, which you can build for less than $500—and there are a dozen other plans in the volume.

Nowhere else will you find plans like these—authoritative, complete, lavishly illustrated with photographs and working drawings which make it easy to build your own airplane. Pick any one of the half dozen ships in the Manual and start to build it from the plans in the book—all you'll need will be tools, materials and a workshop; the Manual supplies everything you need in the way of plans and instructions. No use delaying—get your copy NOW!

PARTIAL LIST OF CONTENTS

A Two-Place Ford-Powered Monoplane
Building the Ramsey Flying Bathtub
Plans for the P-H Biplane Racer
How to Build the Heath Super-Soarer Glider
Lessons in Glider Flying
Plans for a Penguin Practice Plane—motorcycle-engine ship for boys; does not take off the ground
Model Plane Tows Glider
Equipping Your Hangar Workshop
How to Build Good Wings
Streamlining Your Light Plane
And scores of others.



Price 50 Cents — On Sale at All News Stands

If your news dealer is sold out, send 50 cents to Fawcett Publications, Inc., 529 South Seventh Street, Minneapolis, Minn., and a copy of the NEW 1932 Flying and Glider Manual will be sent you at once.

ANDY'S SHOP MAIL BOX

(Continued from page 30)

Well, the flood continues. And this guy Rabl! How his designs do get built! The readers seem to eat up Sam's stuff. Some smart boating editor ought to make Sam a proposition to turn out a half dozen real designs for their sheets instead of the somewhat smeared sketches which monthly grace a few of the mags. Sam is too conscientious to smear out a design. Before he lets it go from his drawing board he must know that it works. No pretty pictures from Sam that are called designs. His stuff goes!

* * *

Here's another toot for the Baltimore Bugeye Bug:

Jacksonville, Fla.

Dear Andy:

If I'm shouting up the correct alley, O. K. If not, please pass my inquiry to the right Dept.

I want to get the dope on "Wanderboat," and what issues of M. M. was it published in, and can they still be secured? If so, can they be forwarded to me C.O.D.?

Enclosed is a snapshot of the "Sunray" sloop built from the plans of Sam Rabl in the 1930 "How to Built It."

Built her myself, last winter, with no extra help and she proves an able boat and a good sailer on all points.

I think Mr. Conner, of Lake Gem, Fla., has the right idea about an M. M. Boating and Yacht Club. I'm for it 100%.

If you start a club, count me as member.

Sincerely,

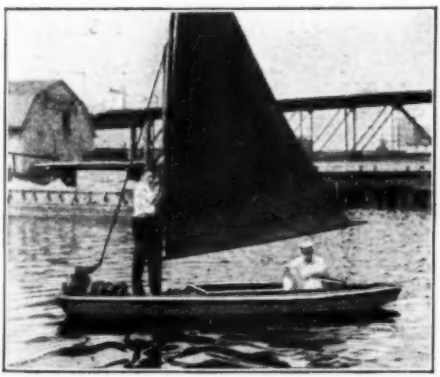
R. B. HELLER.

* * *

Another letter about a Sunray comes from David S. Forsyth, Los Angeles, Cal. Can't run the letter, but the picture is reproduced below.

* * *

I guess there won't be any M-M Boat Club, but you gents who have been kicking about not getting a break in this column can rest satisfied for the balance of the year that I'm doin' you proud with copy, eh boys?



David Forsyth's Sunray, built to Modern Mechanix and Inventions plans. She is a smart sailer and is inexpensive.

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WITTE LOG & TREE SAWS

Cuts down trees and saws them into blocks of any length. One Man Outfit. Make big money turning timber into cash. One man cuts 15 to 40 cords a day. Make Ties, Fence Posts, Firewood—Ready market. Powerful Gasoline-Kerosene Engine with Sure Fire Waterproof-Troubleproof Magneto. Starts easy in cold weather and runs other farm machinery. Thousands in use. Also Portable and Buzz Saw Outfits. Shipped from Kansas City or Pittsburgh.

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FREE

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Attachments are supplied mounted on mandrel. To change attachments, merely loosen hand wheel and slip into collett . . . .

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Special Offer: Send $3.00 for Master Bench Head postpaid or C. O. D. We will send you FREE one 4" x ¾" all-purpose grinding wheel and 4" buff mounted on separate mandrels. We also supply disc, wire brush, wood carving tools, machine bit drills, skate sharpening attachment at low prices. Write for booklet.

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Issue No. 3 of the Mechanical Package Magazine

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MINIATURE 4-CYLINDER AUTO DESIGN
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MODEL SPEED BOATS
PACK MAG CROSS COUNTRY TWIN

And a dozen other treats!

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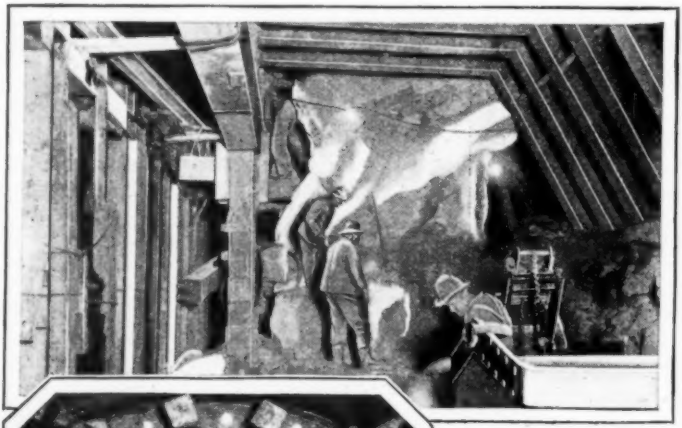
MASTER HONE MAKES EVERY BLADE LAST LONGER

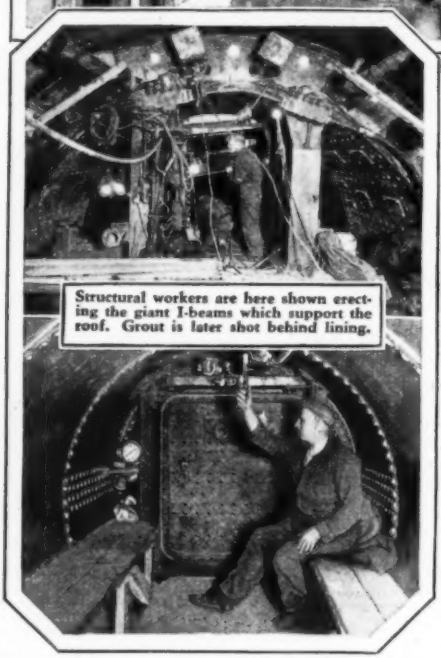
Hazards of BORING the

by
Alfred Albelli

Sudden disastrous accidents are the daily fare of workers "holing through" the world's longest tunnel, which will supply oceans of water to New York. Read here startling facts about this gigantic project and about the mechanical means used to reduce death toll.



Tunnel shooters on the job "holing through." With wheel supports and lagging in place, muckers are removing the debris after a blast.



Structural workers are here shown erecting the giant I-beams which support the roof. Grout is later shot behind lining.

"Bends," the tunnel worker's greatest affliction, caused by sudden decrease of air pressure on coming to surface, is prevented by bringing men out in this decompression chamber.

TUNNEL shooters seldom get the spotlight. In this calloused age of mechanical wonders, when the casual observer must be startled from his lethargy by a riotous fanfare in order that he might apprehend some signal achievement, a noteworthy scientific undertaking is apt to suffer obscurity.

There is probably no more nondescript worker on the American engineering and industrial scene today than the tunnel mucker, or his counterpart in straight subway construction, the sandhog, yet this unsung tribe is responsible for "holing through" the longest tunnel in the world. Also the costliest.

Their super-herculean feat was performed not in the Alps, the Andes or the Sierras, but at an average of 500 feet down in the bedrock of New York. Engineers and dynamiting crews worked with 3,000 muckers night and day for three years to finish the 20-mile tube which is going to be known as City Water Tunnel No. 2.

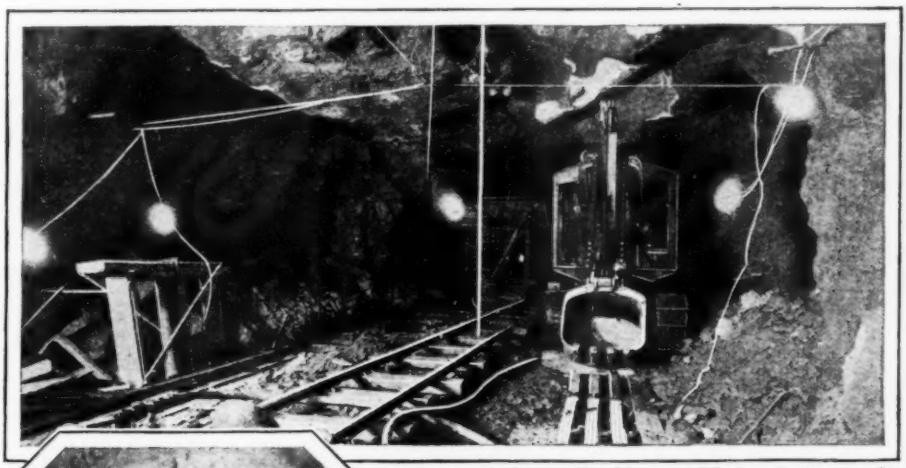
60 Men Killed, 500 Hurt on Job

The bore will cost the city of New York about $44,000,000 when it is completed next Spring. It will supplement and eventually replace Tunnel No. 1 which has been in operation without interruption since 1917. The new tunnel was designed in anticipation of a possible water famine in 1950 when, it has been estimated, the population of Greater New York will be more than 10,000,000.

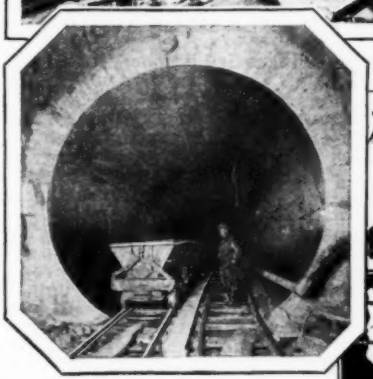
Some conception of the hazards which were faced by the workers in driving through the solid interior of the earth might be gleaned from the Board of Water Supply statistics which show that 60 men lost their lives during the work, and more than 500 were hurt, many of them seriously.

The Yonkers Tunnel, as the latest underground passageway is generally known, was started on March 9, 1929. It was proposed to connect the Kensico storage reser-

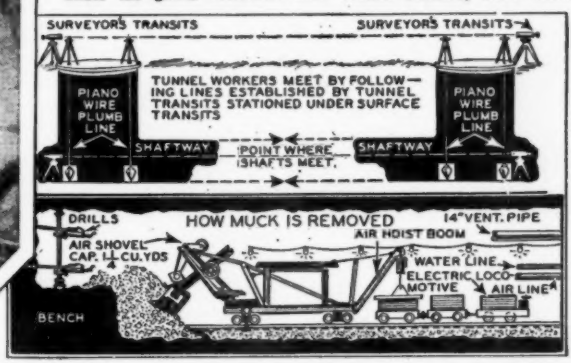
World's Longest TUNNEL



Underground photo made with great difficulty. It shows section under the grand concourse near Yankee Stadium, New York.



Here is section of tunnel showing concrete work completed. 10,000,000 New Yorkers will be supplied with water flowing through this tunnel, which at several points runs approximately 750 feet beneath the earth's surface, deeper than the Empire State building is high.



Ever wonder how engineers manage to make tunnels meet squarely? Plumb line on surface drops down into tunnel, and surveyors establish lines by sighting on surface and in tunnel simultaneously. Below—removing muck.

voir at Valhalla, N. Y., with the Hill View distribution basin in Yonkers, and then penetrate to New York's five boroughs.

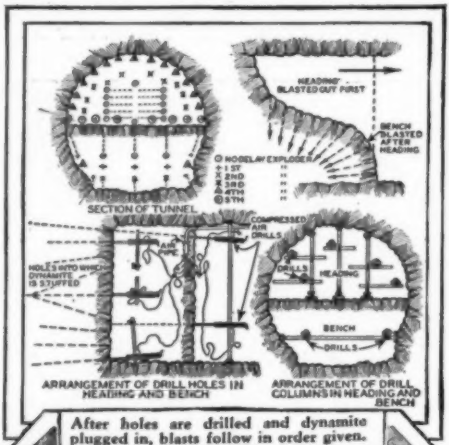
The tunnel proper begins at the Hill View reservoir in Yonkers and extends through the Bronx, Manhattan and Queens to Shaft 17-A in South Brooklyn. In some spots the men blasted as low as 750 feet beneath the earth's surface.

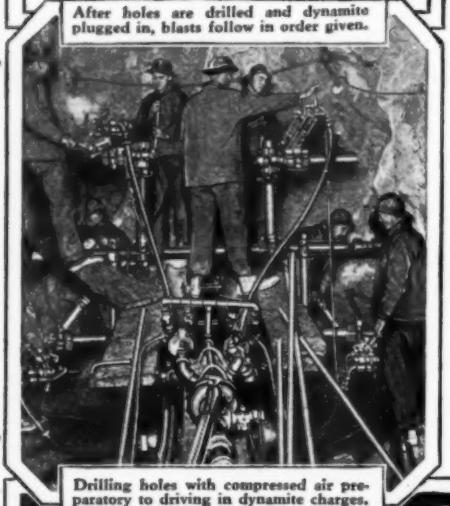
Dangers loomed in these nether regions when the workers struck what engineers call "popping rock." This is rock which appears sound but suddenly "spalls" or crumbles from the roof or sides of the tunnel as soon as any pressure is applied. When one of these portions are contacted, tons of rock crash like rumbling thunder and catastrophe is left in the wake if the men are not aware of the condition.

Every precaution that geologists could avail themselves of was taken to avoid this surprise popping and disintegration, but there were instances when the instruments of science failed to gauge the quirks of Nature and tragedy followed.

Another jinx to which the tunnel burrower was exposed was "pitch." This in the subterranean worker's jargon is unexploded dynamite. There were instances in the boring of the Yonkers tunnel when the driller, forward man of a tunnel brigade, encountered pitch.

The clattering rat-tat-tat of the spear on the pneumatic drill would suddenly pierce





After holes are drilled and dynamite plugged in, blasts follow in order given.

Drilling holes with compressed air preparatory to driving in dynamite charges.

its way into a vein where a charge of dynamite was imbedded. Though the utmost of care was exercised in attempting to locate these "pitch notches," a number of fatalities were due to this misfortune.

Besides the loosening of rock and hidden charges of dynamite, the third bugaboo of the tunnel maker is the premature setting off of the explosive.

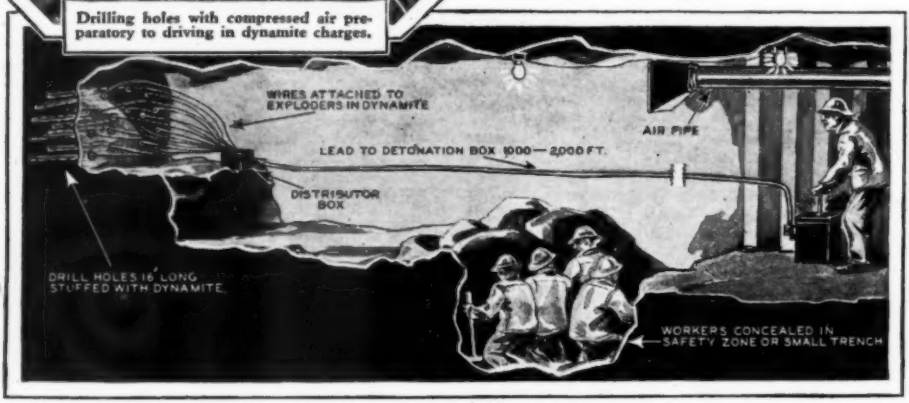
On the night of April 7, 1931, fifty-five men were working near a shaft at 167th Street, 605 feet down. This distance is equivalent to the height of a 70-story skyscraper. The drillers were driving their spears into a "bench" and the rearguard of muckers were at their places on donkey-carts to clear away the rock after the blast. Hundreds of tons were to be pried from this solid underworld with the next touch-off.

Wedged-shaped holes were being riveted through the granite walls to make room for the insertion of the long, paper-wrapped dynamite caps. A circle of smaller holes were being bored around this central aperture. That is the technique of tunnel drilling. The first hole was 14 feet deep, the rest were 12.

500 lbs. Dynamite in One Charge

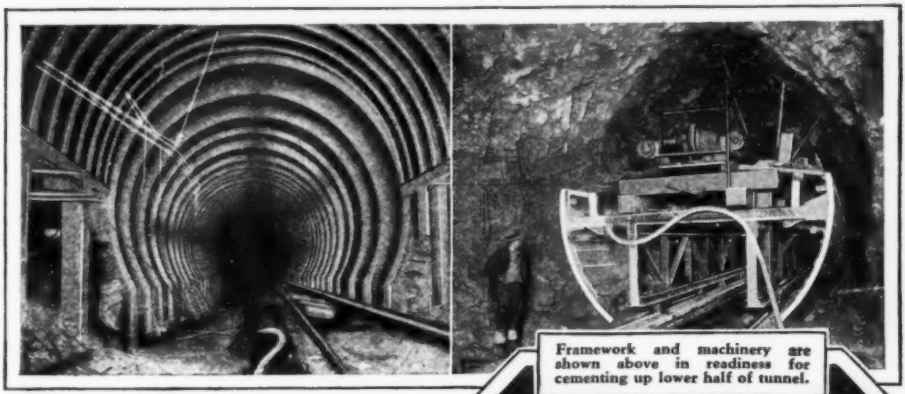
After the drillers had finished, their helpers brought up the dynamite, which was secreted in magazines, hewn from the sides of these underground mountains. About 1,100 dynamite cylinders were tapped into the drilled holes. This was a cargo of 500 pounds of dynamite, sufficient, the engineers explained to this writer, to blow the Empire State Building to smithereens.

As the process normally went, an electric current would flick the charge which would set off the dynamite and the muckers would load the rock onto the carts which would in turn be drawn to the shaftway by an electric locomotive. There steam shovel crews and derrick men would help hoist the blasted mass to the surface.


WIRES ATTACHED TO EXPLODERS IN DYNAMITE
AIR PIPE
LEAD TO DETONATION BOX 1000—2000 FT.
DISTRIBUTOR BOX
DRILL HOLES 18' LONG STUFFED WITH DYNAMITE
WORKERS CONCEALED IN SAFETY ZONE OR SMALL TRENCH

Artist drawing illustrates how blasting is carried out. Men take refuge in safety zone several thousands feet back, while dynamiter, behind shield, sets off charge with detonation box. It is here that many of major tunnel disasters occur. In dynamiting, heading or top section is blasted away first, then bench. After blast the muckers remove rock in cars.

Dangerous Popping Rock in Tunnel Held up by Frame of Giant I-Beams



Framework and machinery are shown above in readiness for cementing up lower half of tunnel.

Loose, falling rock, or what engineers call "popping rock," is frequently encountered in tunnel excavation and must be supported by arrangement of steel I-beams seen above.

But on this particular fatal night tragedy was destined to alter the routine. As soon as the dynamite had been stuffed compactly into the holes with wooden mallets, the workers withdrew en masse to the safety zone, about 1,000 feet to the rear. The blaster, who is the touch-off man, started for the detonation set, an equal distance behind.

The decks were cleared, so to speak, for another perfect blasting.

No sooner had the touch-off man reached the detonation set and put his hand on the switch and gave it the regular jerk than a mucker ran excitedly toward him and waved and shouted to "Hold it!"

How Fatal Accident Occurred

But it was too late. The command was echoed by the devastating grumbling of rock mass, ominous and death-dealing. More horrors in Black Luck Aqueduct, as this project became known with the increase of tragedies. Its toll surpassed that of any other underground engineering endeavor in history.

After the hollowed bulk of rock had settled, the men dashed from the safety zone compartment to find that five of their comrades had ventured into the explosion area after the mucker superintendent had given the blaster the order to "Shoot!"

Two superintendents, one of them the person who had given the touch-off man the order to throw the switch, were killed. Three of the workers were seriously injured. Investigation disclosed that the men had apparently gone back to attend to some detail and they did not dream that the mucker-messenger would fail to reach the blaster in time to prevent him from "shooting."

In all there were seventeen shafts driven. Considering the vastness of the project, Thaddeus Milliman, chief engineer of the New York City Board of Water Supply, pointed out to me that the casualties were

In working under rivers, where fissures are present in rock, tunnel is often flooded with water. To staunch flow, grout, or water and cement, is forced into the cracks. Heading is blasted away when cement sets, leaving fissures plugged up.

gratifyingly low considering the hazards faced by the workers.

In some parts, for instance, the engineers suddenly struck watery sand. At these points they had to drive down pneumatic caissons. It took them seven months to advance 100 feet through a soft bedding of sand at one segment in the Bronx. They also had to contend with large inflows of water as they bored beneath rivers along the course of the tunnel.

Concrete and Steel Line Tunnels

More than one-fourth of this conduit has big steel I-beams to support the roof. One marvelous engineering feat was performed under the East River, which flanks the east side of Manhattan Island, from April to October, 1931.

In order to strengthen this portion, giant iron sections, 21 ft. in diameter, were welded together to form a one-inch steel interlining between an outer layer of reinforced concrete and the regular concrete wall of the bore. The average diameter of the tunnel, however, is 17 feet.

Frequent Stimulation by Coffee Necessary to Heftiest Tunnel Workers

Photo above shows tunnel nearing completion. Note the muck train tracks in center of tunnel.

Dynamite is stored in specially hewn chamber leading off the main tunnel.

Now that the tunnel has been driven, its walls are being lined with a concrete jacket and grouted. By grouting is meant the process of forcing liquid cement behind concrete under enormous pressure so that no cavities are left. When all other mechanical installations and adjustments are completed, the pressure in the tunnel will be such that the water will rise to a height of 280 feet above sea-level by its own force.

For some bare statistics: The Yonkers Tunnel is 105,000 feet long. Over 1,600,000 cubic yards of rock and 150,000 cubic yards of earth were extracted from it. There were more than 1,300,000 drill holes shot and 7,000,000 pounds of dynamite were used. It was holed through one year ahead of contract provisions.

130 Underground Passageways in New York

In modern times, with the improvement in implements and trained mechanics, notable work has been done constructing short-cuts underground, under rivers and through hills and mountains. In New York City alone there are 130 underground passageways of varying degrees of size.

The $50,000,000 Holland Tunnel, linking New York with New Jersey under the Hudson River, required seven years to build.

Sixteen lives were lost through accidents which occurred during work on the Holland Tunnel. Clifford Milburn Holland, after whom that undertaking was named, was called the martyred chief engineer. He died during its construction.

One of the earliest records of tunnel construction work in history reveals that the Roman Emperor Hadrian set the slaves of Athens to hewing a water tunnel in 169 B. C. They were ignorant of compressed air drills and explosives, of course, and they trusted to the crude instrument of fire. They built huge bonfires against the wall

(Continued on page 149)

Excessive air pressure in tunnel works havoc on worker's constitution, only the strongest being able to stand the gaff. Even these must take "shots" of heavy coffee constantly throughout the day for stimulation to offset the effect of air on the lungs. In this photo is shown the tunnel air gang taking time out for a little nourishment. All resources of science are called forth to preserve workers' health and guard against accidents.

No More Shall the Ice Man Mess Up the Kitchen Floor

ICE men are always welcome visitors in the hot summer time, but there's a lot of unkind thoughts when he departs because of the mess of ice water he leaves in his trail. To remedy this situation, there has been introduced a special carrier, shown in the accompanying photo, which serves both to dam the Niagara of ice water and protect the ice man's back against the cold.

The carrier is made of brown canvas treated with paraffin and reinforced with an iron frame. From one side of the top a heavy strip of canvas depends, serving as a cover for the carrier and also protecting the iceman's back. The block is carried as demonstrated in the photo.

There's no Niagara of ice water pouring down from the ice man's cargo when he carries it into the house in this newly invented bag. The flap guards his back against cold.

Famines Come Every 164 Years

DUE to recurring planetary influences, we are in for world-wide famines and many other similar disasters every 164 years, is the belief of Inigo Jones, eminent meteorologist of Australia. Mr. Jones believes that planetary influences which he describes act on the earth through the medium of changes in the weather, which are due, in turn, to changes in the sun. Earthly weather is known to be influenced importantly by changes in sunlight and in the sun's heat, corresponding to the sunspot cycle and the positions of the planets.

Smashing Window Drops Shutter

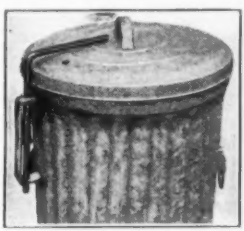
Iron shutter drops down when thief smashes window glass.

DOUBLE protection is afforded jewelry windows with a new thief proof shutter recently introduced in England. A burglar bent upon making a haul from a jewelry display window may smash the glass, but that's as far as he'll get, because when the glass receives the blow of the brick heaved at it, a hefty iron shutter automatically drops down from the top to guard the gems from depredations. In the photo above is shown the inventor, William Samuel, of London, after putting his creation to a test.

Garbage Can Cover Makes Fortune

C. M. BOHMAN, superintendent of a large New York apartment house and an inveterate reader of mechanical magazines, noted in an article like Mr. Yates' "Fortune Making Ideas for Inventors" that some sizeable cash awaited inventors who could perfect needed labor-saving devices. Then one day he noticed how the wind would blow ashes all over the street from uncovered garbage cans.

Suddenly an idea dawned on him and he set to work devising a clamp that would keep the covers of the cans in place and yet withstand the rough treatment of the garbage men. He invented a simple device to fill the bill and it was immediately approved by the New York Dept. of Sanitation, who now contemplate making use of the device compulsory. The invention, shown in the accompanying photo, is now being made in large quantities and Mr. Bohman is well on the way to success.



Spring activated arm on side of can keeps cover always in place.

Disappearing Steel Bars on Window Baffle Kidnappers

When window, made of shatter-proof glass, is raised these steel bars are also raised, baffling kidnappers. Lowering top window does no good either, for it has more steel bars.

SPURRED by the kidnapping of the Lindbergh baby, a young Indiana inventor has developed a set of novel disappearing bars for windows of bedrooms or nurseries to safeguard such places against the breaking-in peril.

As long as the new window is closed, it resembles any normal window, but when the lower half is raised, it pulls up a set of steel bars from holes in the lower sill. When the upper half of the window is lowered, another set of bars are pulled down. These bars are set 6 in. apart.

Low Cost Steel and Glass House

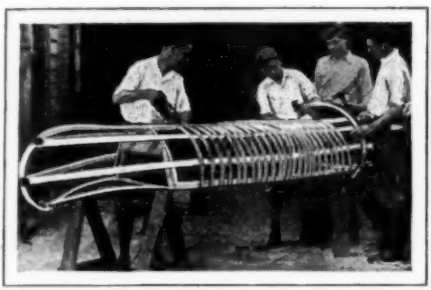
AFTER many years of experimentation a Chicago inventor has perfected a moderate-priced steel and glass house which promises to revolutionize the home building industry. Sixty per cent of the floors and ceilings are electrically welded steel, while more than forty per cent of the walls are glass. Steel "I" beams form the frame of the house, sheet steel bent into shape at the mill being welded onto this skeleton.

Air conditioning and heating units maintain a constant temperature, while transparent, specially treated glass admits the healthful ultra-violet rays of the sun.

This steel house for families of moderate salaries has walls 40 per cent glass, and ceilings and floors 60 per cent steel.

Youths Build Sturdy Canoe for $4

LACK of cash didn't faze four youngsters in Norfolk, Va., who wanted to build themselves a canoe. Nothing daunted, they set about realizing their ambition by first making a tour of some fruit stores in the neighborhood to collect a few armloads of barrel hoops. Then, for the few extra dollars needed to buy canvas, they did odd jobs around the neighborhood. With all the materials at hand, they borrowed the tools and set to work. In a few days, the canoe, shown in the process of construction below, was completed and launched, and all at a cost of less than four dollars.



These youths built their canoe for only $4, which was earned at odd jobs. Ribs, which proved plenty substantial, were made from old barrel hoops. Tools were borrowed.

No Remedy for Jellyfish Sting

THAT medical science is still baffled by the poison of one of nature's lowliest creatures, the jellyfish, is admitted by experts of the American Medical Association. One tentative suggestion is an alkaline application, such as a wet paste of bicarbonate of soda. Another is to wash the injured skin with fifty per cent alcohol. The only other suggestion is the use of sedatives to make the jellyfish victim forget his pain until the injected poison disappears.

Jellyfish have thousands of tiny stinging tails scattered over their bodies. The tip of each such tail is a sharp, hollow needle, through which a paralyzing poison enters the body of the jellyfish victim like a drug from a hypodermic syringe.

Seaway Opens Great Lakes to Ocean Ships

With the completion of the 27-foot St. Lawrence Seaway linking the Great Lakes ports with the Atlantic Ocean, the agricultural, manufacturing and mining products of America's great inland empire will be shipped direct to world ports without necessity of trans-shipment overland to New York and other ports. Note wide variety of commodities produced.

Automobile With Aerial Cable Tracks Is Latest in Ferries

The last word in ferries. Automobile with grooved wheels crosses back and forth on pair of cable tracks, being guarded against rail-jumping by extra trolley overhead.

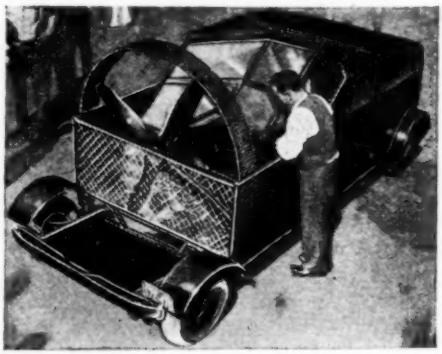
ALL records for novelty in the field of ferry boating have been smashed by a couple of Virginia youths. What they did to achieve this distinction was to stretch a couple of strong steel cables across a creek to form a pair of aerial tracks on which an automobile actually crosses back and forth.

The tires have been removed, however, and the rims especially revamped to fit the cableway. Just in casé the car jumps the track, there is an overhead trolley ready to take the load, so that passengers on the unique ferry need have no fear of an unannounced ducking. No turntable is necessary at the terminus of the tracks, for the car just backs up on the return trip

Wind Drive Auto of the Future

AN AIRDRIVE car, which the inventor claims heralds a new day in the automotive industry, has recently been given successful performance tests on city streets and country roads in and near Detroit.

The car, shown below, has the general appearance of a well streamlined automobile, with the addition of an air prop on the front. Powered by a 4-cylinder airplane engine of 100 h.p. the machine develops 60 m.p.h. without effort. The box-like body frame sets close to ground, supported by 4 650x10 airplane wheels. There is no transmission, clutch, differential or universal.



Powered by 100 h.p. engine, this air drive car passed successful tests in negotiating roads in and around Detroit.

Rubber Bait Like Real Angle Worm

DISCIPLES of Izaak Walton will welcome a new bait that has been perfected by Earl Cooley, of Alamosa, Colorado. Using live worms as models, Mr. Cooley has worked out a realistic worm in rubber which is an exact duplicate of the real thing in points of color, resiliency, and squirminess. It has a very decided movement in running water, a little in quiet water, and is practically indestructible. As shown at the left, the "worms" come already baited in the hook and dipped in anise oil or whatever scent solution that conforms to the laws of the states where they are to be used.

Made of rubber and soaked in anise oil, this bait has resiliency and color of a real worm. Comes wound on hook as shown.

The bait has been winning wide approval among fishing fans throughout the country for its effectiveness.

Experiments Show Death Feeling

HOW it feels to die was learned at an experimental hanging conducted at the University of Bucharest, Roumania. The "executed" victim was strung up temporarily, and as soon as the flow of blood to the brain had ceased and consciousness was lost the victim was revived.

Two sensations were recorded. At the instant the flow of blood ceased, there was experienced an apparent burst of light in front of the eyes, like an explosion of fireworks. Next there followed a sensation of sudden shock like a severe blow.

PRIZE *Answer to Falling Scales Puzzle*

NATHAN HALE once made an historic remark to the effect that he regretted having only one life to give for his country. When it came to the crucial task deciding upon the winner of the Falling Scales problem set forth in the July issue of MODERN MECHANIX AND INVENTIONS, the judges found themselves in pretty much the same embarrassing situation—they had only one prize to give for a desk load of clear, concise and highly intelligent solutions.

Reading over the solutions was an exhilarating job, but some awful misgivings descended on the judicial conclave when the final moment came to say: "This letter wins." It was almost decided to determine the winner by the eenie-meenie-minie-mo method, but that recourse was abandoned, and after much heavy cerebration (thinking) the judges decided to make out the prize winning $10 check to Manley Mills, 1309 S. Main St., Anderson, S. C.

Here's Problem to be Solved

Before reading the winning solution, let's review the problem, illustrated in the drawing at the right.

Two scales, one operated by a spring balance and the other by the conventional lever and weight, hold 100-lb. weights and register 100 lbs. on their dials when resting at the top of an elevator shaft. What figures will the scales register while falling, ignoring air-resistance and friction?

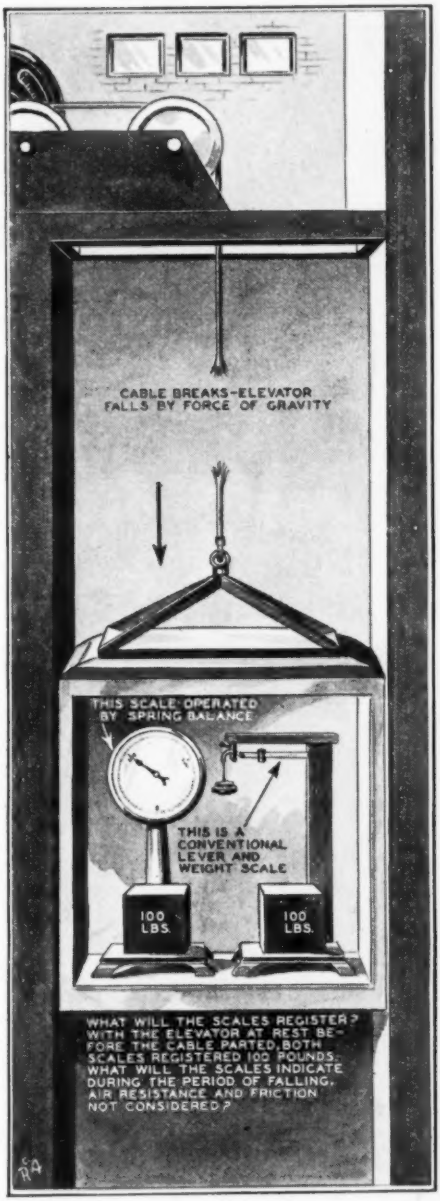
The correct answer is: The lever and weight scale will register 100 lbs. and the spring balance scale will register zero. The clearest and most concise answer as to why the two scales register these weights was what brought home the prize. Let's see how the winner explains the difference in weights.

Prize-winning Answer

While the elevator is falling, the indicator on the spring scales will drop back to zero and remain there as long as the fall continues unchecked. As long as the elevator, and consequently the scales, remains at rest the spring resists the pull of gravity by exerting a force of exactly 100 pounds in the opposite direction from the gravitational pull, the two forces balancing each other. But when the elevator is falling it will accelerate 32.2 feet per sec. per sec., and so will the scales and weight. However, since the weight no longer resists the pull of gravity, the downward force disappears, leaving the spring free to return to its normal position.

On the other hand, the lever-and-weight scales will continue to register 100 pounds. The acceleration caused by gravity (32.2 ft. per sec. per sec.) is same for all objects, regardless of their mass, so the small balancing weights will accelerate just as fast as the 100 pound weight. Consequently, as the elevator falls, there will be no displacement of the weights in relation to each other, and the system remains in equilibrium. This fact can

(Continued on page 151)


CABLE BREAKS-ELEVATOR FALLS BY FORCE OF GRAVITY
THIS SCALE OPERATED BY SPRING BALANCE
THIS IS A CONVENTIONAL LEVER AND WEIGHT SCALE
100 LBS.
100 LBS.
WHAT WILL THE SCALES REGISTER? WITH THE ELEVATOR AT REST BEFORE THE CABLE PARTED, BOTH SCALES REGISTERED 100 POUNDS. WHAT WILL THE SCALES INDICATE DURING THE PERIOD OF FALLING, AIR RESISTANCE AND FRICTION NOT CONSIDERED?

Here is the falling scales puzzle which appeared in the July issue of Modern Mechanix and Inventions. The problem was to decide what each scale would register while the elevator was falling, after a break in the cable. The spring scale will return to zero, but the lever and weight scale will retain its 100-lb. reading. Manley Mills, 1309 South Main Street, Anderson, S. C., prize winner, explains why in his letter in the adjoining column.

Iceless "Ice Box" Lowered in Ground Keeps the Food Cool

Cylinder is lowered into pit as illustrated, weight on other end of wire acting as counterweight. Note cover over top.

A COUNTERWEIGHT on one end, and a cylindrical container on the other end of a steel rope running over two pulleys supported on a pole, makes up the major portion of an ingenious contrivance for cooling foods.

The container, shown in the accompanying photo, fits loosely into a seven-foot hole in the ground lined with a steel casing. It has three shelves, and a door closes it off from the outside. Three iron rods about four feet long run from the top of this "cooler" container to the sustaining end of the rope or cable.

At the point where these rods are connected there is a large circular cover securely fastened. As the cooler is eased downward into the casing in the ground this cover settles over the brim of the casing, and closes it off from the outside. The photograph shows the cover within a few inches of the brim, the cooler being inside the casing.

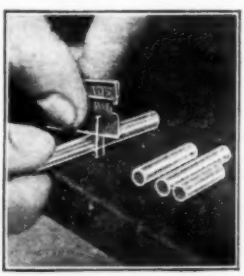
This cover and the fact that the container is suspended by it several inches above the bottom of the hole, keeps rodents, dirt, and water out of the cooler. The counterweight keeps the device stationary at any level it is moved to.

How Indians Walked in Fire

ONE of the oldest scientific mysteries, the reputed ability of savage priests and medicine men to make themselves immune to fire, is to be investigated this autumn by government scientists. Educated members of the Fox tribe ascribe this trick to previous bathing of the hands and arms in the juice of an unnamed weed said to grow profusely in the prairie country. This juice is believed to protect the skin temporarily against harmful effects of heat; which fact, if true, might be of considerable practical importance both to industry and to orthodox science.

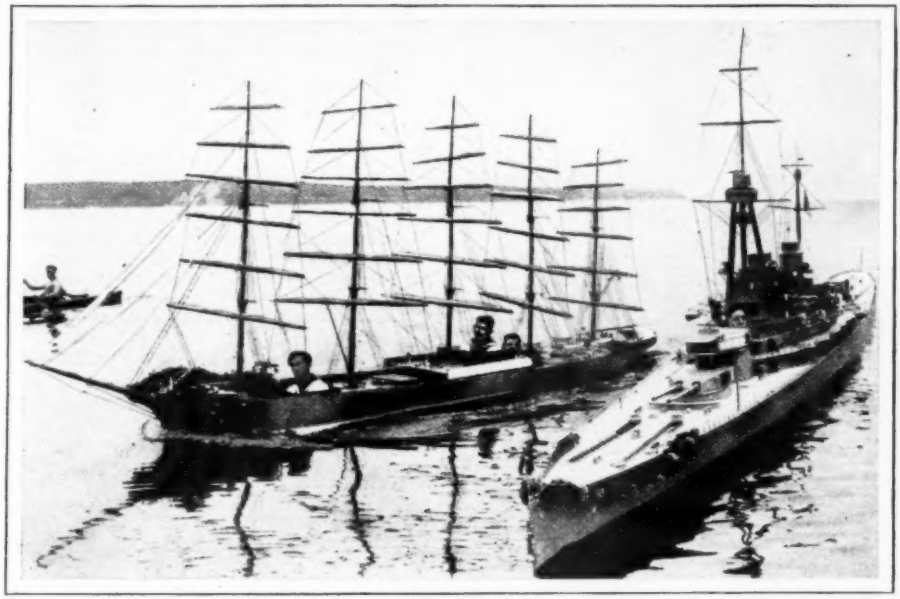
Razor Blade Cuts Glass Tubing

AN OLD razor blade is the only tool you need to cut off short pieces of glass tubing. The first step is to drive in a board two short nails or brads, quite close together, to turn the tubing against, as shown in the photo. Moisten the glass, then stick one corner of the blade into the wood, and press down on top of the other end, the brads serving as a guide. Turn the tubing slowly till you have a deep scratch evenly around it. It will then break easily and squarely when bent by the fingers.



Glass tube is cut by making scratch with razor, as shown.

Young Shipbuilders Take Cruise in Their Giant Models



Real models, these. Built by Berlin youths, they're perfect duplicates of training frigate "Preussen" and cruiser "Hindenburg."

ALL honors for constructing real boat models go to a couple of Berlin youths who have turned out in their own workshops the two amazing creations shown in the photo above. Perfect duplicates of the training frigate "Preussen" and the cruiser "Hindenburg," the two models are large enough to carry real sailor passengers, as you can see in the photo. The model of the "Hindenburg" has full fighting equipment, and an anchor that actually anchors.

Skin Brands to Prevent Frauds

INDELIBLE messages tattooed on the skins of patients who have had surgical operations or have suffered injuries were urged recently in England to prevent fraud. Such a course would prevent duplication of claims by persons who try to collect many times for physical deficiencies which they have had since birth. Often they deliberately undergo an accident to collect damages.

Automatic Secretary Answers Phone, Tells You're Out, Takes Message

AN AUTOMATIC secretary recently invented performs an astounding variety of tasks with almost human intelligence. Shown in the photo at the right, the machine will answer the telephone when you are out, record confessions of criminals at police departments, send a talking night letter over telegraph lines, and even telephone your order to your broker to buy and sell some stock, if you're that gullible.

The device consists of a specially designed telegraph turn-table, with apparatus for automatically recording and reproducing records made from aluminum. When the telephone is ringing, the machine will wait 14 seconds, then lift the receiver, state that you are out and ask if there is any message, or say anything that you have told it to say. It will then record everything that the party calling says and hang up the phone when he or she stops. The only trouble is, the darn thing can't cook.

The automatic secretary which answers, talks over phone.

Washing Machine Motor Drives Midget Auto 12 M.P.H.

12 m.p.h. speed developed by washing machine motor bus.

IT MIGHT be small and funny looking but it goes places, does the little midget car built by Stanley McCrary, of Seattle, Washington.

In building his somewhat diminutive auto, Stanley waylaid an old washing machine and made away with its motor. When he came to the problem of providing a clutch and steering gear, he simply made them in his own workshop. As to the gas tank, well you can see for yourself in the photo at the left.

Stanley's machine develops the breath-taking speed of twelve miles per hour, but be that as it may the darn thing manages to last out a whole day on a gallon of gas, which is supplied at dad's filling station.

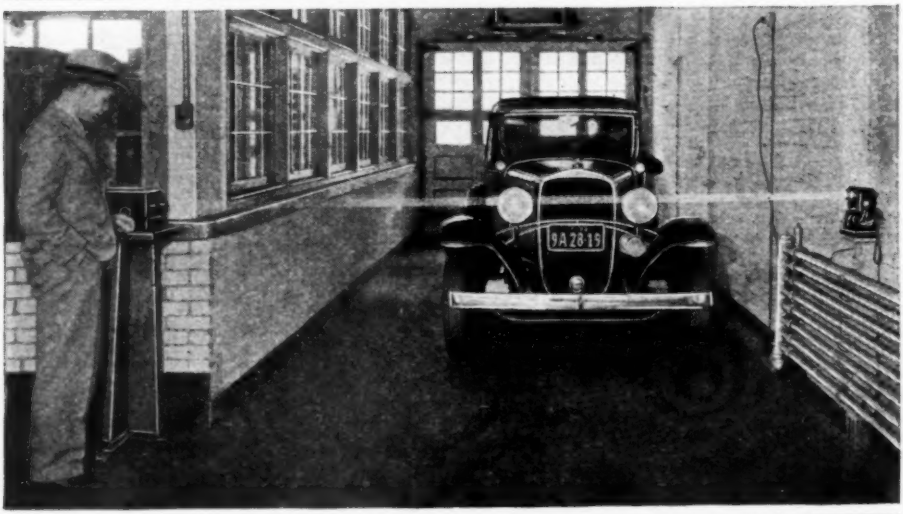
Most 4th July Deaths From Water

STRANGE as it may seem, water and not fire is found by statisticians to be responsible for the great majority of deaths on the fourth of July; with automobiles running a close second. However, it often happens that injuries from fireworks do not tell until later, sometimes months, so that they do not go on record as fourth of July deaths. It is probable that the use of serum has diminished materially death rate figures.

Electric Eye Counts Cars Leaving Garage, Disregards Cars Coming In

THE photo-electric cell, or "electric eye," now adds to its almost human qualities the ability to count people or objects moving past in one direction, the while disregarding those traveling in the opposite way.

This new service is now being performed in an experimental garage at the General Electric Company. Cars moving into the garage have no effect on the eye, but those leaving the repair floor intercept a double beam of light thrown across the runway and are recorded by the counter. A bell is also rung to tell the attendant that a car is leaving the floor.



"Electric eye" counts all cars coming out of garage but disregards those entering for repairs, storage or other purposes.

Sightseeing Cars for the WORLD'S FAIR

Visitors to the Chicago World's Fair, which opens next year, will be afforded the unique experience of riding in sightseeing rocket cars suspended between two towers 600 feet high and riding on overhead cables. One million dollars will be spent to complete the project, illustrated above. A view of the entire fair layout will be obtained from the cars.

Joy-ride on Bottom of Ocean in This Huge Diving Bell

In this diving bell four sightseeing customers can be lowered to the bottom of the ocean to inspect mysteries of sea. Under water rides are sold at one dollar per passenger.

SIGHTSEERS can now drop to the floor of the Pacific Ocean, 100 feet below the surface and four miles offshore, in a giant diving bell which has been put in operation to allow spectators to peek into the mysteries of deep-sea life. Four customers at a time fit into the bell, which is lowered from the deck of the pleasure ship Johanna Smith by means of a crane.

Weighted by 1500 pounds of steel ballast, necessary to overcome its own buoyancy, the bell drops to the bottom of the sea in about a minute. One-inch glass observation windows enable passengers to see what is going on outside. Beneath each window are alternating colored lights which paint the under-water scene in weird effects. Every precaution is taken to make the three-ton cage safe and fool-proof.

There is sufficient oxygen in the bell to last four persons for from six to eight hours. An electrically driven air purifier is in operation at all times. In case one of the windows should break under water, steel flaps can be tripped into place, hermetically sealing the break before an appreciable amount of water can get in. This is the first commercially operated diving bell on record in which customers are allowed to pay for an ocean bottom view.

Ultraviolet Vaccine

A NEW use for ultraviolet rays in making germ vaccines for injection to cure disease, was announced recently. These rays are now used instead of heat to kill the living germs used in making vaccines. In the modern method of protective injections for typhoid or diphtheria, germs are killed outside the body and either the dead germs or chemical materials extracted from them are injected to combat the disease or to stimulate the body to protect itself.

Heat Formerly Used

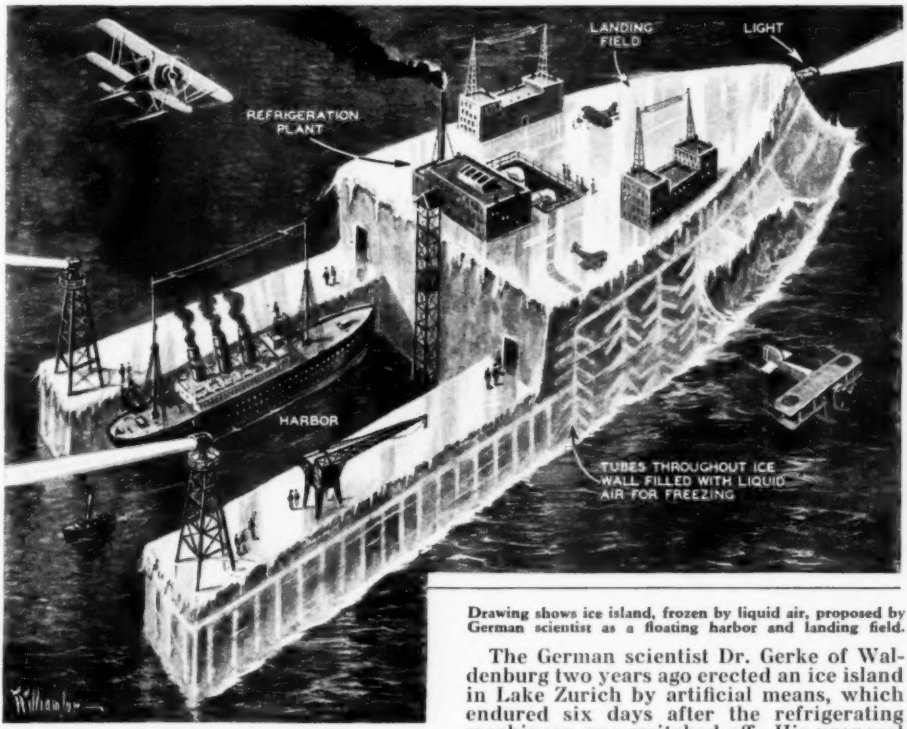
In previous methods of using this last method, the living germs usually have been killed by heating the cultures, which kills them successfully enough, but often seems to damage some of the germ chemicals which it is desired to preserve. Better results have been obtained by exposing the germ culture to powerful ultra-violet rays, which also kill the germs, but leave the chemicals intact. Experiments have been conducted in the London Light Clinic under direction of Sir Leonard Hill.

Sidewalk Checker Game

A GAME which costs practically nothing to play and which is suitable for entertainment at picnics or other outdoor gatherings, is sidewalk checkers, so named from the fact that a huge checkerboard is painted on a sidewalk as shown below. It is just as easy, of course, to mark out the board on hard ground, or to have the squares painted on a large piece of building board. The checkers are blocks of wood moved by poles which fit into metal hooks attached to the tops of the blocks. Kings are designated by pins placed in grooves on top of the blocks.

Checkers on a large scale can be played on this sidewalk board, in which the men are wooden blocks moved by poles.

ICE-ISLAND in Mid-Atlantic Proposed



Drawing shows ice island, frozen by liquid air, proposed by German scientist as a floating harbor and landing field.

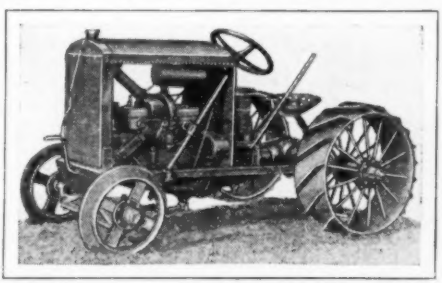
SEADROMES for ocean landing fields are not a new idea, a steel 'drome designed by Edward Armstrong, recently described in these pages, being well on the road to practical acceptance. But the proposal to build seadromes of ice, recently advanced from Germany, seems fantastic until one realizes that the idea has already passed the experimental stage with flying colors.

The German scientist Dr. Gerke of Waldenburg two years ago erected an ice island in Lake Zurich by artificial means, which endured six days after the refrigerating machinery was switched off. His proposal for a mid-Atlantic way station of ice involves the construction of a framework of hollow tubing which, when filled with liquid air manufactured in a refrigerating plant, freezes the water surrounding it into a solid mass.

Design of the island would call for a section on which a landing field and buildings for offices and refrigerating plants could be built.

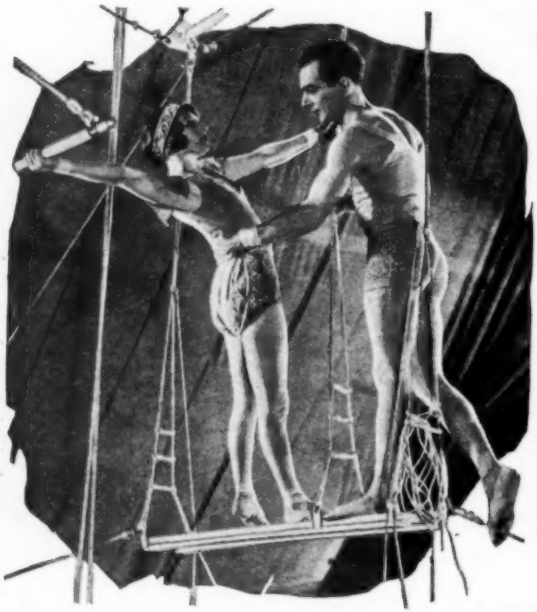
Home-made Garden Tractor Built Up From Junked Automobile Parts

A LOW-POWERED home-made tractor which has proved itself excellent for garden work has been constructed by Homer Rich, of Waynesville, Ill., out of scrap parts from several makes of automobile. The power plant is a four-cylinder Overland motor and the rear end drive is from a Model T Ford. Drive wheels are 28 inches in diameter, with diagonal lugs across the tires. Mr. Rich says that his tractor pulls a 12 and 16-inch breaking plow efficiently, though at comparatively low speed. Steering wheel and radiator are likewise from an auto junk yard. The driver's seat was salvaged from an old cultivator. Gas tank is mounted under the hood.



With a four-cylinder auto engine and Model T Ford rear end, this home-built tractor saves labor for its builder.

DARING DEATH *with the*



Circus aerialists are never unemployed; demand always exceeds supply. But if you want to enter the ranks, take mind of the fact that a miscalculation in time of a hundredth of a second is fatal for the trapeze performer. In this article world's premier aerial acrobats explain tricks of the trade.

Alfredo Codona, premier aerialist of the world, with a member of his troupe. Codona's fame is based on the execution of the triple somersault. He is one of the few individuals in all history who has succeeded in perfecting this perilous stunt.

ONE slip, one erratic split second, and it's lilies for the aerial acrobat.

Although the casualties in this form of dare-deviltry are heavy—with hardly a single circus stand finishing without one of these high altitude performers meeting with an accident—the glamor and the allure of the arena makes this dauntless race of acrobats forget.

"We have to forget," Clara Codona, of the famous Codona clan of flying trapeze performers, told me as she occupied a hospital wheel-chair, with her back in a plaster cast. She was recuperating from her latest fall. It occurred early last summer at the Madison Square Garden in New York.

Not a "Foolproof" Profession

"I can say positively," continued Madame Codona, "that there is not a single performing aerialist who has not met with a mishap. Regardless of what good luck attended them, their miscues might have meant Death.

"That is why I say that we must forget. If we allowed those terrifying memories to linger with us up to the moment we climbed the steep ladders we would be licked.

"The aerialist population is an amazingly small one. Although it is a lucrative vocation, men and women do not rush into it as they might some other big-paying profession. It is one field that is not over-crowded. One does not go to an acrobat college, obtain a diploma and then go forth as a high-wire walker or a trapeze leaper.

"The popular gibe in which one person wishes that another's children be born acrobats has a different significance with us. Nothing could be more desirable. That is exactly what we maintain—that a successful acrobat has to be born to his calling."

The Leap of Death

The history of aerial acrobatics dates back to the thirteenth century when tumblers and mountebanks began picking high elevations for their breath-taking didoes. The casters took their somersaults with them to the high places. The double somersault was mastered in time, and then they tried the triple.

All through the story of the acrobats from century to century, according to available authorities, there are instances of fatalities when the proficient double-somersaulter tried to advance to three complete turns aloft. This stunt finally took on the nickname of *salto mortale*—the leap of death!

Alfredo Codona, premier aerialist of the world, represents the final stage in the

AERIAL Acrobats

by BEN LINCOLN

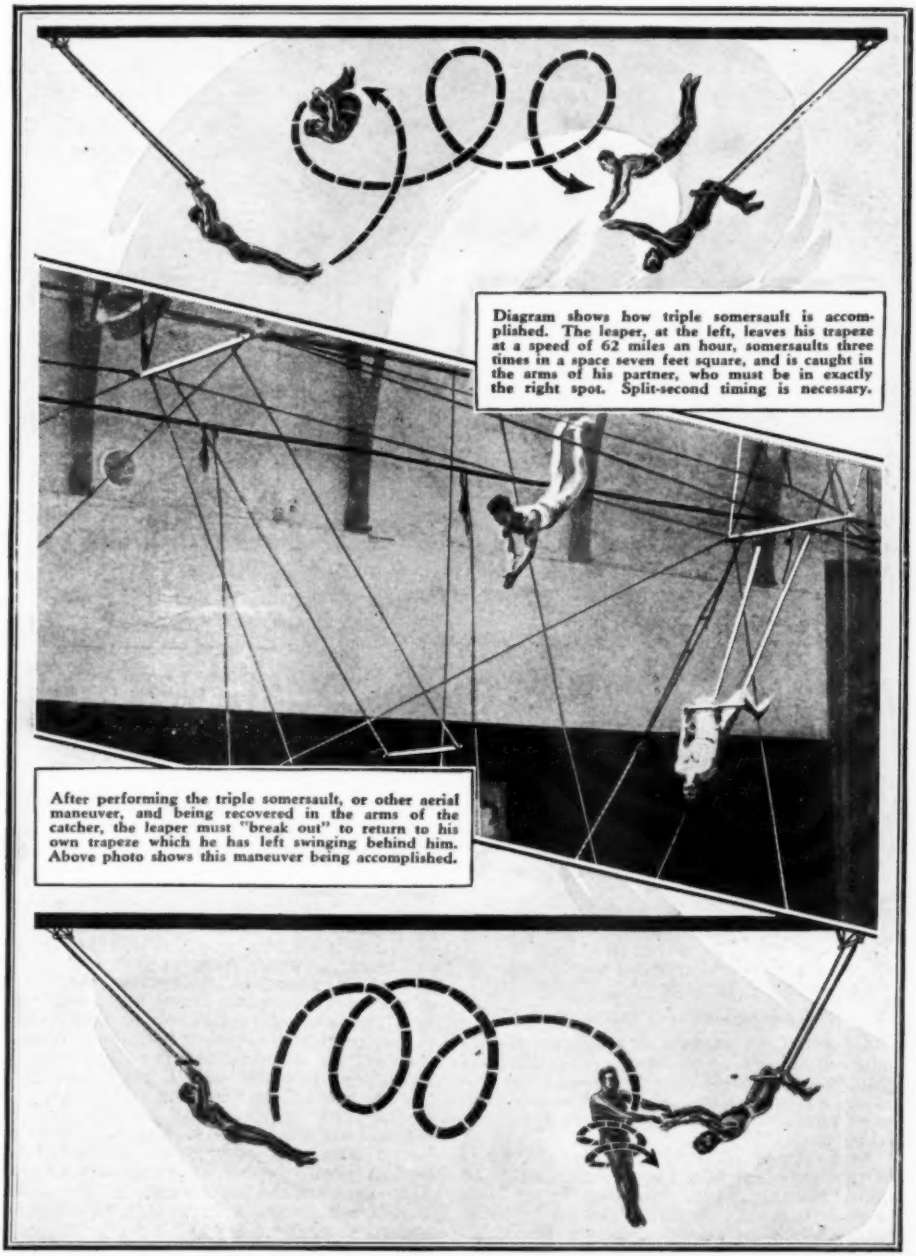
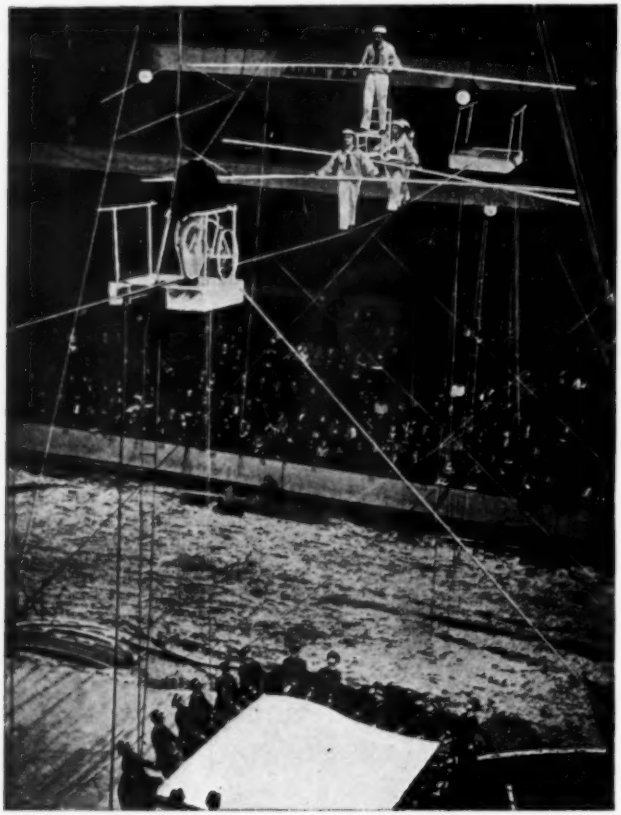


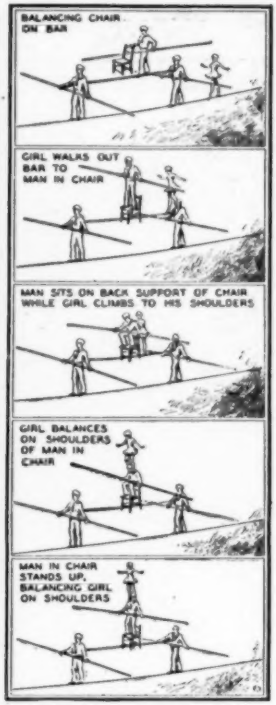
Diagram shows how triple somersault is accomplished. The leaper, at the left, leaves his trapeze at a speed of 62 miles an hour, somersaults three times in a space seven feet square, and is caught in the arms of his partner, who must be in exactly the right spot. Split-second timing is necessary.

After performing the triple somersault, or other aerial maneuver, and being recovered in the arms of the catcher, the leaper must "break out" to return to his own trapeze which he has left swinging behind him. Above photo shows this maneuver being accomplished.

The double somersault and pirouette, as performed by the Clarke brothers. The two somersaults require exactly three and a half seconds, leaving a half second for the pirouette. The time required must not vary more than a split second.

The Four Wallendas Have Unique Aerial Act, Spectacular to Watch




BALANCING CHAIR ON BAR
GIRL WALKS OUT BAR TO MAN IN CHAIR
MAN SITS ON BACK SUPPORT OF CHAIR WHILE GIRL CLIMBS TO HIS SHOULDERS
GIRL BALANCES ON SHOULDERS OF MAN IN CHAIR
MAN IN CHAIR STANDS UP, BALANCING GIRL ON SHOULDERS

One of the most perilous of all stunts is this act of the four Wallendas, shown step-by-step in the drawings. The net is no real protection, since a fall into it can easily be fatal to the performer.

evolution of the triple somersault. Both his parents before him and his grandparents were circus performers. At the age of 2 he was already an adept tumbler.

I do not mean to intimate that six centuries went by without producing a triple somersaulter. There have been others, but the records show that Alfredo Codona tops them all. There are features to his act which have never been surpassed.

Here is how he does it:

Leaping 62 Miles an Hour!

Alfredo Codona swings off from a pedestal about 60 feet above the tanbark ring. Two swift pendulum-like movements of his trapeze and he has accumulated enough momentum for his death defying act.

As he takes off from his trapeze, he is being propelled at a speed of 62 miles an hour, nothing more, nothing less. Lack of precision in this detail would be fatal. He shoots into three complete turns, all within a space not exceeding seven feet square.

As he is going through these revolutions, Lalo, his brother, who is the catcher in this feat, keenly watches Alfredo as he goes into his final leap, and then Lalo swings off on a trapeze from a pedestal which is in line with Alfredo's leaps. Lalo's knees are crooked in his pedestal and his down-swinging arms are set to catch his brother as he breaks out of the triple.

Timing is everything in this feat. Lalo is a very important cog in the machinery of this performance. True, Alfredo's success is centered in his ability to time his three turns so that he will have sufficient leeway on completing the last one to straighten out and reach for Lalo's grip.

On the other hand, if Lalo's gauging of the time consumed by Alfredo and the amount of time that it will take him to reach from his own pedestal, in his inverted pose, to the point where Alfredo "breaks," should be erratic, then serious consequences are sure to follow.

And vice versa should Alfredo make an error of calculation. The net means very little when one of these accidents occur. To the spectators it presents a psycho-

Riding Wheels Across a Tight Wire Calls for Utmost Balancing Skill

Spectacular indeed is this stunt, in which a motorcycle is ridden over a tight wire. The only aid to the performer is the removal of tires so the wheel rim can grip the wire.

logical phenomenon which minimizes the dangers of the aerialists. To the performers it is no secret that the wrong kind of a fall into the net can be fatal.

The eminent Codonas have had their slips. They do not believe that they will never have another. Once Alfredo broke out of the triple and struck Lalo on the chin, knocking Lalo unconscious.

Hospital Ready for Failures

Both of them went hurtling through the air. Alfredo landed in the net face downward. His brother, still unconscious, crashed onto his back with a heavy thud. As a result of the impact, Alfredo suffered five broken ribs. Both of them underwent long hospital sieges.

Alfredo Codona, who possesses a singular ingenuity for constantly appraising his work to the minutest of details, later explained that the accident had been due to the fact that he had misgauged his time in leaving the bar for the first turn of the triple by less than 1/100 of a second.

Practice, Courage, Skill Needed

The Codonas cannot explain their triple somersault. It will not bear analysis. One cannot separate the ingredients as one might some laboratory compound. That is because the component parts of the act are to be found in hereditary traits or physical movements cultivated from childhood days.

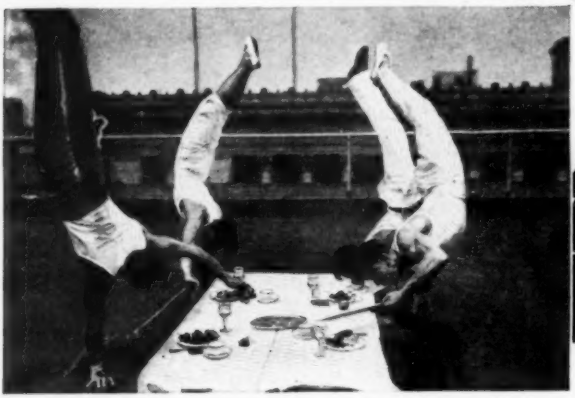
Their only explanation, aside from the point that it's got to be born in you, is that it has taken years of practice and patience. An indomitable courage in the face of constant bumps and bangs, which was what they suffered steadily in a Shreveport, Louisiana, barn which served as an improvised circus setting.

A hazardous demonstration of skill—riding the wheel on the ground would be an accomplishment of no mean merit. The balancing pole, though necessary, is extremely dangerous in case of a fall, being likely to strike the actor.

Edward Codona, their father, himself a famous trapeze performer in his day, rigged up the apparatus one winter as Alfredo and Lalo decided on an impulse that they would like to attempt the triple somersault. Clara Codona, known as the Queen of the Flying Trapeze, was also there to offer advice.

They persevered that entire winter,

"Mechanic," or Supporting Vest, Used in Perfecting New Aerial Stunts



Physical development is seen at its peak in these gymnasts who, balancing on one hand, eat a meal from a low table

In practicing new stunts, a "mechanic" or supporting vest is used, held up by pulleys.

limiting themselves at first to five flops a day. And they were honest-to-goodness bruisers too. There was no net and they did not care to use a "mechanic."

Safety Vest Helps in Practice

The mechanic is the lifebelt of the aerial-acrobat profession. It fits around the performer's waist like a vest, being made of leather. There are cords attached to the vest and they run to pulleys at each end of the area within which the aerialist is working.

These pulleys are operated by a man known as a "patter." He is the guide. He watches the acrobat going through his routine and it is up to him to give the actor sufficient slack to move as if he worked independently of the safety attachment. However, if the patter is not skilled in operating the mechanic, the artist is doomed. The man at the pulleys must be an expert at the art of leverage.

The Codonas, as I have already said, resolved not to use the mechanic, and consequently they took a heavy dose of spills. But when the day came when Alfredo succeeded in doing fifteen triples without the slightest deviation in time, and without any variation in the distance for their execution, the joy of the Codonas was boundless.

The Art of Timing

The next handicap to overcome was the catching. Alfredo would go through his three revolutions beautifully, then suddenly find himself scrambling to the barn floor. His brother, Lalo, was missing. Until Lalo was able to master his swings so that he would meet Alfredo at the precise point, Alfredo continued to go tumbling down. Most of the time he broke the falls expertly.

Careful studies eventually led to success. The Codonas were now in possession of the most precious prize of the flying trapeze profession—the triple somersault. They concentrated on co-ordination of mind and muscle. There were no instruments to guide them. They made it through sheer perseverance.

Lillian Leitzel, famed circus aerialist, is shown here training a youngster for the profession. She suffered fatal injuries in Denmark a year ago when a rope on which she was performing suddenly broke

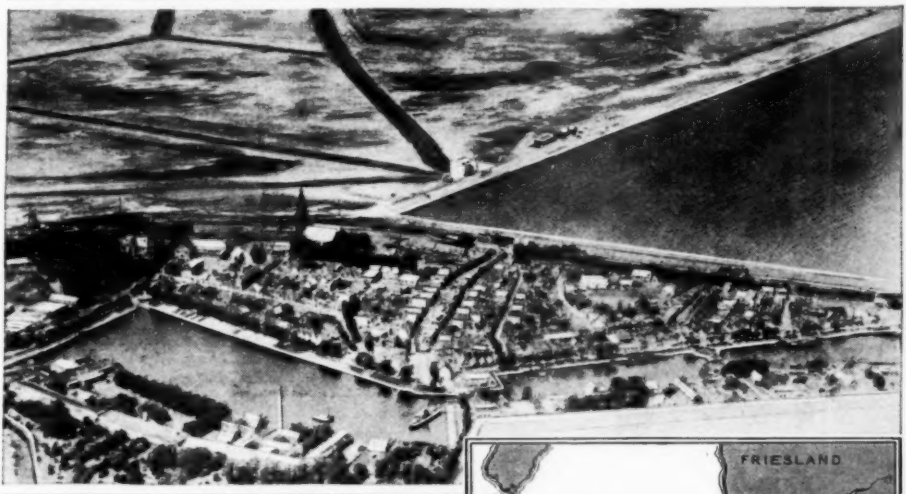
Today the Flying Codonas are nonpareils in their field.

There is still another family of aerial peers. They are the Wallendas. Two brothers strut out on a high wire, maintaining their balance by means of twenty-foot poles. Another pole is carried on their shoulders.

A third brother then sallies forth over the cable, bearing a chair in addition to the pole which helps him with his equilib-

(Continued on page 153)

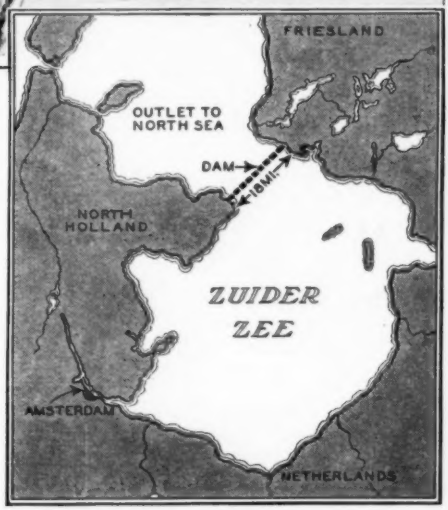
Zuider Zee Dam Reclaims Half Million Acres



Here's aerial view of a portion of the 523,000 acres of sea-bed which has been reclaimed from the famed Zuider Zee.

THE 523,000 acres of sea-bed that was the famed Zuider Zee in Holland is soon to become agricultural land. This gigantic reclamation project is to be made possible by the construction of an 18-mile dam between Friesland and North Holland, and separating the Zuider Zee from the North Sea.

The dike was begun in 1920, as the inauguration of a 20-year drainage program, and has just been completed, at a cost of $50,000,000. The sheltered body of water is to be known as Lake Yssel, which will in time be drained off, leaving more than half a million acres of fertile land for cultivation. Already a large portion of the submerged land has been reclaimed, as can be seen from the aerial photo above.



Dam cutting off Zuider Zee from the North Sea was built between Friesland and North Holland at point shown.

Thief Can't Steal This Billfold

Thief-proof billfold is anchored in pocket by a safety clasp.

YOUR billfold is safe from pickpockets when you're using a new money carrier that has just been placed on the market. The protective agent is a safety clasp which locks billfold in your pocket to prevent loss by theft or accident. A slight movement of the finger is all that is required to lock the billfold in place or release it.

Meteors Fight Shy of U. S. Cities

CALCULATIONS of the average number of meteorites which ought to strike in United States cities and towns, where they might cause serious damage or loss of life, indicate that about one meteorite out of 66 should strike some urban area, or an average of three each year. Statistics indicate, however, that only one meteorite struck a city in the last seven years. It thus appears that meteorites deliberately avoid cities, which nobody believes, or else that many of those which do fall in urban areas are not reported. Calculations show that 170 of these celestial visitors strike the U. S. each year.

"Pneumatic Swimming Suits" Make Wearer Drown-proof

Pneumatic swimming suits, which serve as life belts in emergency, are inflated by wearer as illustrated. Air tight bag is formed by part of the cloth and keeps swimmer afloat.

WHAT might be called a pneumatic swimming suit has been perfected by an English water sports enthusiast. What the invention amounts to, though, is a combination swimming suit and life belt which the inventor claims makes it impossible for the wearer to sink.

The life belt section of the suit is inflated in the manner demonstrated in the accompanying photo, and when so blown up will keep a swimmer afloat for hours without slightest peril. The suit has been adopted for use by boatmen, yachtsmen, airmen, and deep-sea fishermen.

Now You Can Talk, See Over Phone

TELEPHONE companies are constantly trying to develop new conveniences for subscribers. The latest aid to communication is two-way "telephone vision" which was recently introduced in Paris. Resembling television in many respects, the phone system employs the customary battery of photo-electric cells and scanning discs. Two communicants talk to each other over wires and see projected on a screen before them the photographs of each other. As the photo below shows, the electric eyes are mounted in panels at the side, while the viewing screen stands directly in front of the talker.

The latest in telephonic communication—a two way "telephone vision" which enables talker to see party at other end of line. Operates like television in most respects.

Mower Cuts Rough Sward Easily

GARDENERS who have large tracts of hilly lawn committed to their care will be glad to learn that there is now available a power mower which eliminates much of the difficulty of cutting grass on irregular ground. The machine has only one wheel, with a cutting bar having a swivel action, thus permitting it to follow the contour of the ground while the machine remains upright. Thus it can lay low weeds and briars as well as lawn grass, and may be adjusted to any height.

Power from the gas motor is conveyed through the swivel arm to the cutting bar by means of a set of gears. Teeth of the cutters are set at a distance most suitable for both grass and small bushes.

With cutting bar mounted on end of swivel arm, this mower can negotiate irregular turf with greatest cutting efficiency.

Electric "Chair" for Decrepit Dogs

AN ELECTRIC chair for dogs, not for punishment but to provide painless deaths for animals so old or ill that death is really a great kindness, has been devised by the Vienna, Austria, Society for the Protection of Animals. The dog which is to be put to death is allowed to stand in a shallow zinc pan containing a little salty water, which forms one terminal of the "chair." The other terminal is a special collar that makes contact with the skin. The path of the current is such that nerve centers which control heart and breathing action are instantly and painlessly paralyzed.

Oddities of SCIENCE

by NIC SPRANK

TWO HALVES DO NOT ALWAYS MAKE A WHOLE — 1 PT. OF ALCOHOL MIXED WITH 1 PT. WATER = .97 OF A QUART —Paul P. Pura, Winnipeg, Man.

GLASS IS MUCH MORE ELASTIC THAN RUBBER. (Elasticity is ability of a body to resume its original shape after distortion — not degree of extensibility.) — H. T. Irwin, Sewickley, Pa.

WHEN FRENCH BURGUNDY IS POURED EFFERVESCENCE CAUSES A PERFECT STAR TO FORM AT TOP OF GLASS. (Bubbles follow contour of hollow stem.) — Gilbert Burns, Minneapolis, Minn.

AN AVERAGE HORSE DOES NOT EXERT ONE HORSEPOWER — ONLY ¾ H.P. (A horsepower is a unit representing 33,000 ft. lbs. of work per minute, adopted by James Watt, steam engine inventor.) —Joe Pitts, Montgomery, Ala.

A TON OF WATER FROM THE DEAD SEA WEIGHS ONLY 1811 POUNDS. (The other 189 pounds is represented by salts in solution.) — Roy L. Clough, Ashland, N.H.

A HOUSE WILL BEND UNDER THE WEIGHT OF A BUTTERFLY ON ITS ROOF. (No substance is rigid to a perfect degree.) —Fred Buchwitz, Minot, N.D.

ONE DOLLAR will be paid by Nic Sprank for oddities of science used on this page. Send in your ideas—no limit to the number of suggestions you may make, but be sure to enclose proof of your statements. Maybe your ideas will be better than those shown on this page—if they are, Nic Sprank wants them and will be glad to send you a check. Address suggestions to Nic Sprank, care of Modern Mechanix and Inventions, 529 South Seventh Street, Minneapolis, Minn.

Look Out for SWINDLERS

by ORVILLE H. KNEEN

PADLOCK your purses and hoard your gold — the "scientific" swindlers are coming! A flood of such schemes is in the making, ready to be released when the next boom gets under way. Even now we can "get in on the ground floor" of such recent scientific advances as television and radio, or rise to the heights of independence in weird aircraft. Promoters' promises were never more glowing.

Thus a prospectus issued by a New York go-getter announces "the world's largest heavier than air ship," "fast rotation aeroplanes," a vast aerial transport system, contracts "to be obtained from the Navy and Army," etc., whirling us up in the air with these words:

Exaggerated Claims

"This corporation will build the world's largest and most technical and powerful heavier than air flying Airship, capable of resisting all weather conditions upon the sea and air. This airship when complete will be of the staggered wing type which has been found to be the most technical solution wherefrom to extract the power from within the sphere of true stability and lifting efficiency."

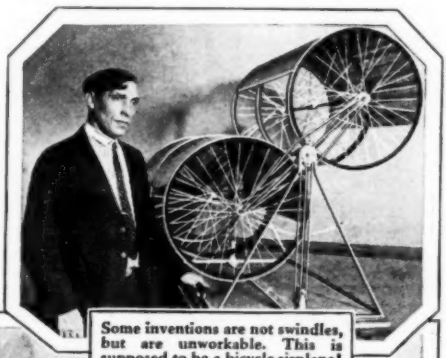
What more could you ask for your money? But investigators failed to get his exact meaning, and induced the "inventor" to cease his "technical" operations before much money was donated. They had to admit that he was resourceful, however, as he proposed to manufacture, while getting ready to build airships, such diverse items as fruit pickers, kitchen utensils, home furnishings, "educational spinning toys," and last but by no means least, a foot swimming device.

What this airy financier lacked in education was more than made up by the promoter of the latest electric cure-all. As he was going to jail a few months ago it was learned he was a university graduate—in electrical engineering. To sell his patent "ionizers" he resorted to such high-voltage methods as spending over a thousand dollars a week on radio programs.

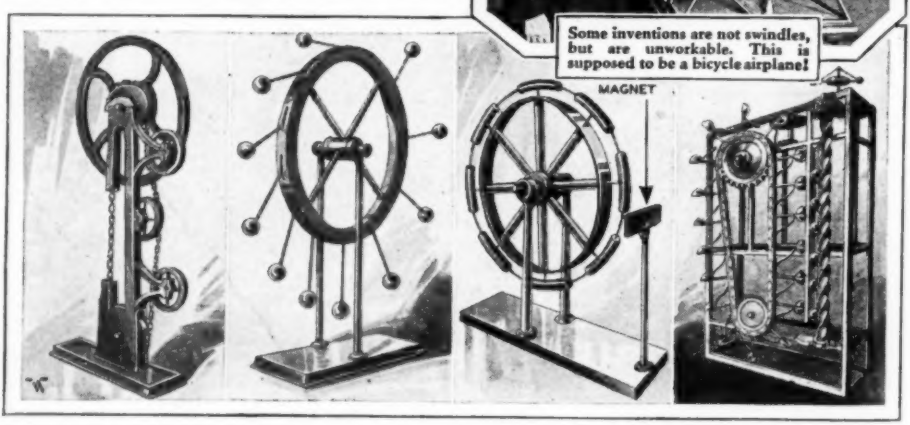
1000 Per Cent Profit

Not only did half a dozen stations radiate his appeals to the ailing, but several doctors short-circuited hundreds of dollars in weekly commissions by "advising" patients to buy the "horse collars," as reputable physicians dubbed them. They cost the ionizing engineer less than $10 apiece, but he sold thousands at $100 each.

The art of extracting gold from the un-



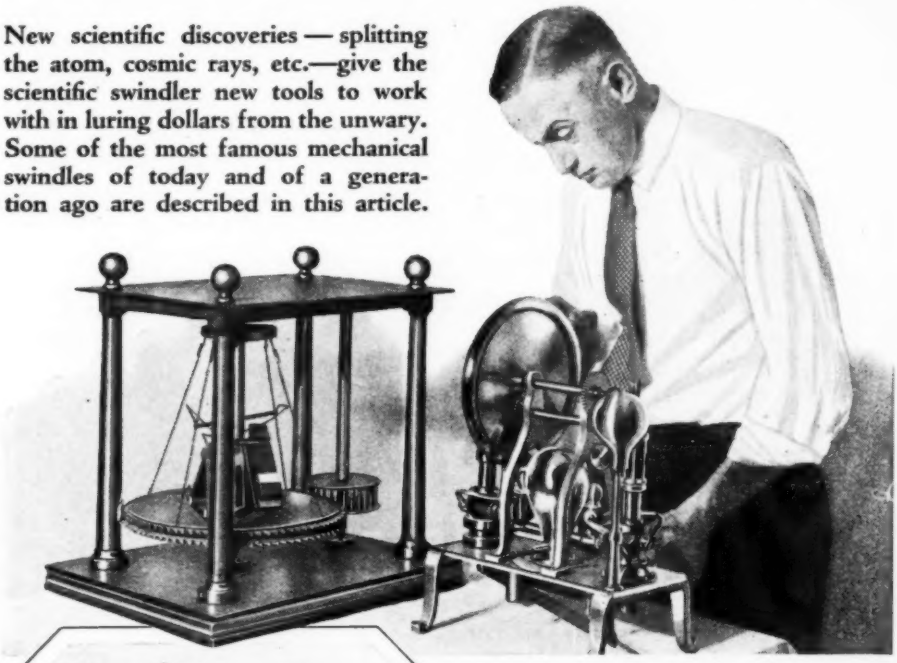
Some inventions are not swindles, but are unworkable. This is supposed to be a bicycle airplane!



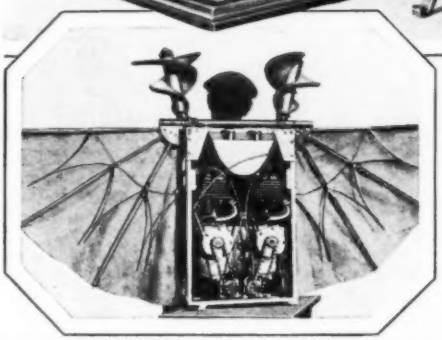
Human desire to get something for nothing explains the search for perpetual motion. Here are four favorite types of perpetual motion frauds. None of them work, except to lure many dollars from the pockets of credulous investors.

Who Turn "SCIENTIFIC!"

New scientific discoveries — splitting the atom, cosmic rays, etc.—give the scientific swindler new tools to work with in luring dollars from the unwary. Some of the most famous mechanical swindles of today and of a generation ago are described in this article.



Two famous frauds of a generation ago are shown above. At left is a Redheffer mechanism, claimed to be a perpetual motion machine, which was operated by a hidden spring wound by turning one of the knobs on top. The other machine is one of the famous Keeley devices, claimed to run from some mysterious "etheric force," seized from the air.



Interest in airplanes has opened up a vast field of freak inventions. This "Human Flying Wing" is the product of a Viennese mechanic who has hooked a couple of one-lung motors to spiral propellers adjacent to his head.

wary requires better technique from year to year. Thus back in 1880 electricity was known only in the laboratory, and almost anything would shock the pocketbook nerve. It was in that year that a certain "Professor" Wingard invented, or at least announced, probably the first of the numerous "death rays" which have wiped out so many bank accounts, if not cities.

From a safe distance the Professor shook scientific as well as naval circles, by blowing up the hulk of a schooner in New Orleans Bay. He guarded his mysterious electrical apparatus night and day, and for two years perfected his annihilating invention. The end of all navies seemed in sight when he showed up in Boston and formed a stock company.

His first modest request was for a mere $1,800, wherewith to put on a demonstration. After convincing skeptical scientists and capitalists, millions would be his for the asking. The Professor installed his electrical outfit on a small steamer, in the deckhouse, and guarded it closely. Long before the day of wireless, he proposed to explode dynamite placed on the distant vessel, some miles away, by electrical emanations.

When Plans Go Wrong

The experts and the inventor boarded the little steamer, while two men in a rowboat set out to place the dynamite in the old vessel. Suddenly a terrific but premature explosion shook the bay, and especially the Professor. He called off the demonstration, but nothing was suspected

until the rowboat and the two mangled bodies were inspected.

A long rope finally gave the Professor away. He admitted that his scheme was nothing more than having the men attach the rope as they placed the dynamite. He exploded it by pulling on the rope. While not very ingenious, as such inventions go today, it would have blasted open many a bank account if the dynamite had been more carefully handled.

Hard to Say What's Impossible

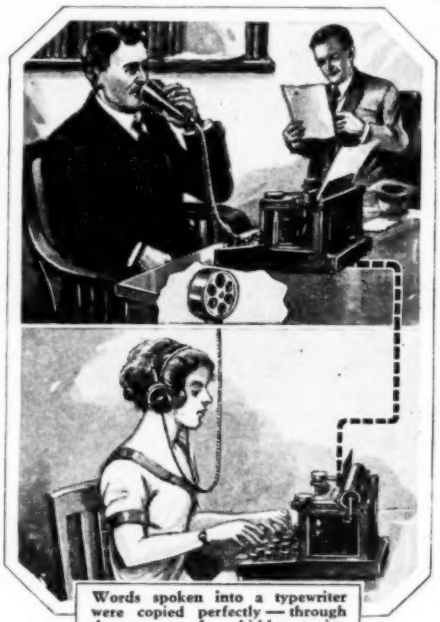
Who can say what is impossible today? Weird devices such as "electric brains" quickly solve intricate problems. Machines switch great generators on or off without attention, as load requires. Other robots steer boats and airplanes better than human hands. Unseen electric eyes guard vaults, count traffic, turn switches.

The teletypesetter will set type in any number of offices at the same time. The teletypewriter enables us to type our own messages in distant offices. Typed messages can be sent by radio—a device which stocketeers could use in place of long-distance, with which they now telephone from New York to San Francisco, if necessary, to hook a customer for a new offering.

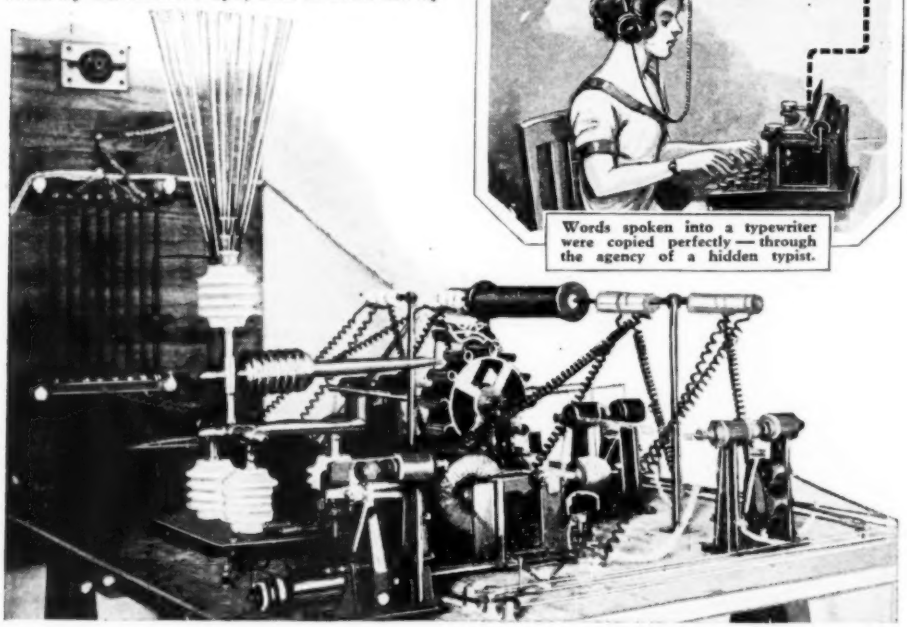
Swindlers seem to be outclassed when a real machine is produced, as it was recently, whereby specially-typed copy is read by an electric eye, and is then set up in type without human hands. Another device is the talkie-typesetter, which makes a film when copy is read into it, and then sets the type.

But an ingenious promoter has put all these machine age marvels in the shade. Realizing how many business men yearn for an errorless typewriter, able to tap out letters all day and night, at top speed and without even time out for lunch or nose-powdering, he developed just such an Iron Tillie. He may have heard of just such a machine actually built, which did take dictation and deliver finished letters.

But whereas this machine could only



Words spoken into a typewriter were copied perfectly — through the agency of a hidden typist.



View of a French machine to produce atmospheric electricity. Mechanism is highly mysterious, to impress the credulous and to conceal operating device. An expert can find out what makes such things go, but experts are not invited to inspect them.

"Death rays" have a firm hold on the popular imagination. Here a so-called ray stops the engine of a motorcycle. Such rays, though widely publicized, have never been perfected.

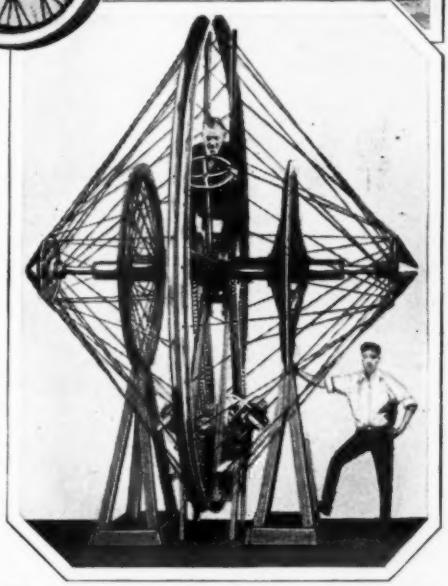
spell cat with a "k," for example, the promoter's perfect automatic typewriter came through with the correct "c"! As he or the prospective investor talked into it, rods and wires and gadgets humped themselves, electrical contacts flashed and snapped and buzzed. In a few moments the copy slid out—letter-perfect.

Secret of the Fraud

Here was the greatest invention of the age! Investors planked down their money for stock, to get in on the ground floor. But detectives from the Better Business Bureau, while the inventor was absent, went down lower yet—to the basement. There they discovered a rapid typist, with a microphone strapped to her head. Whenever she struck a key, it worked another upstairs. The arrangement, while of some advantage in removing too-attractive stenos from the sight of tired business men, was not considered a real investment. The promoter vanished, as did the investments.

Radio-Controlled Cars

Think of the millions made by those who invested in Ford cars! Or radio! Get in on short-wave ground floors, or a super-something! Promoters find that electric waves are very effective energizers of the pocketbook nerve. Thus we all know of radio being used to control battleships, submarines, even airplanes and aerial torpedoes. What more logical, then, than a radio-controlled automobile?



This invention of a cycle car isn't necessarily a swindle, but it's so far from being practical that the investor who buys stock in the contraption is taking a long chance.

Such cars have been demonstrated, but no one knows a use for them, unless perhaps for bloodless wars, in which radio-operated machines charge each other while the armies camp safely behind, with the generals. But a glib promoter found a very practical use for such a machine recently, in a Middle Western city.

He invited prominent and well-heeled

citizens to ride in a car with himself. Ahead of them a driverless automobile, with mysterious doo-dads under the hood and elsewhere, threaded its way through the traffic. Invisible waves, sent out from their own car by the promoter, seemed to direct the leading car unerringly. Much impressed, the citizens invested heavily in this "latest achievement of science."

Is It Practical?

But investigators from the local Better Business Bureau failed to see what the thing was good for, except perhaps as a new alibi for running past a red light. When the promoter was busy promoting subscriptions they poked around the apparatus which filled the radio-car. And under the front seat they found a small chap, perfectly willing to be uncomfortable in the cause of science and finance. He was able to guide the car as required, and thus the radio-car was very simple in operation. But the stock went off the market.

Swindlers have a great variety of scientific wonders with which to work today. X-rays, ultraviolet rays, electric and magnetic and short waves, atomic and radioactive, high tension and high pressure and high frequency, sounds we cannot hear and light we cannot see. We are in exactly the right state of mind for picking. New devices are being invented for our benefit, while tried-and-true frauds like perpetual motion and gold-from-seawater are being scientifically refurbished.

Magnetizing Buried Treasure

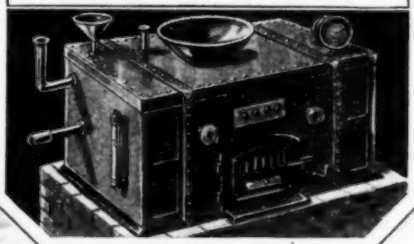
A Kansas farmer (not one of those in need of farm relief) was informed not long ago that his farm held a fortune in buried Indian treasure. Oddly enough, the stranger knew precisely how much there was, and to locate the $475,000 exactly he produced a unique scientific instrument.

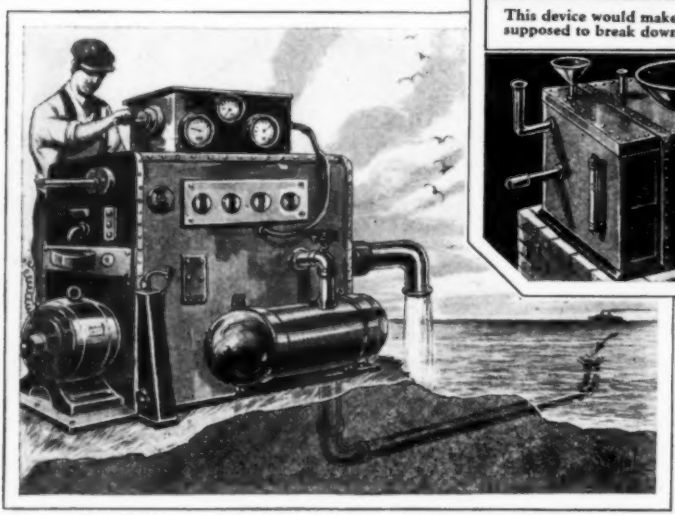
All the fortunate farmer had to do was to turn over $4,000 to the stranger. His device would magnetize it, by a secret process, and its magnetic properties would at once locate the hidden fortune. The whole thing was amazingly simple—especially in view of the treasure-hunter's willingness to donate the lion's share to the farmer, when he could just as well have hogged it all himself.

The farmer raised the $4,000 by a mortgage, and turned it over to be magnetized. Then the stranger made himself invisible, also by a secret process. But something went wrong, and he failed to disappear completely and suddenly enough. So he landed in the county hoosgow.

This kind of treasure finding, to be successful, requires attention to all such details. Nothing is so important to the scientific swindler as the final fade-out at the psychological moment.

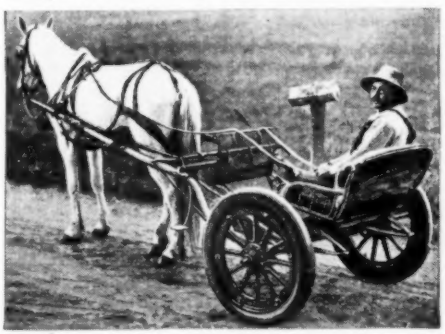
This device would make a fortune if it worked. It's supposed to break down water for burning as fuel.





Transmutation apparatus, such as shown above, is supposed to turn lead into gold. Auriferous salts, among the secret ingredients, fool the unwary when gold is produced when heated. At left, extracting gold from sea water is possible, but the cost is exorbitant. Scientists working on this project have abandoned it. A thousand tons of water yield an ounce of gold.

Latest in Travel—Two-Wheeled Cart With Auto Tires



Rough roads hold no terrors for this auto-wheeled cart.

MARTIN SOADACK, combination farmer and general handyman of Baldwinsville, New York, likes comfort when he rides, and the rocky and rutty road between his home and town had none of these conveniences to offer.

But was Mr. Soadack downhearted? He was not. A little mechanical ingenuity was brought into action and now Mr. Soadack suffers from the "jounces" no more. What conquered the situation is shown in the accompanying photo. When Mr. Soadack had decided that he had been bumped about for the last time, he descended upon a junkyard and there procured two old auto wheels. Next he procured a two-wheeled cart, and then assembled his acquisitions.

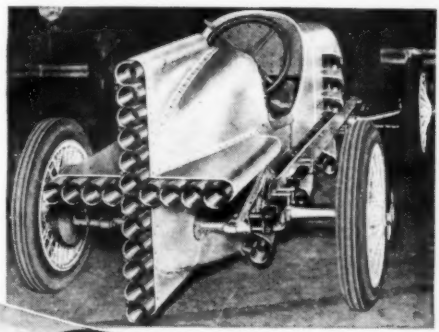
Now Mr. Soadack rides to town in comfort and is said to give his friends the laugh when he passes them on the road.

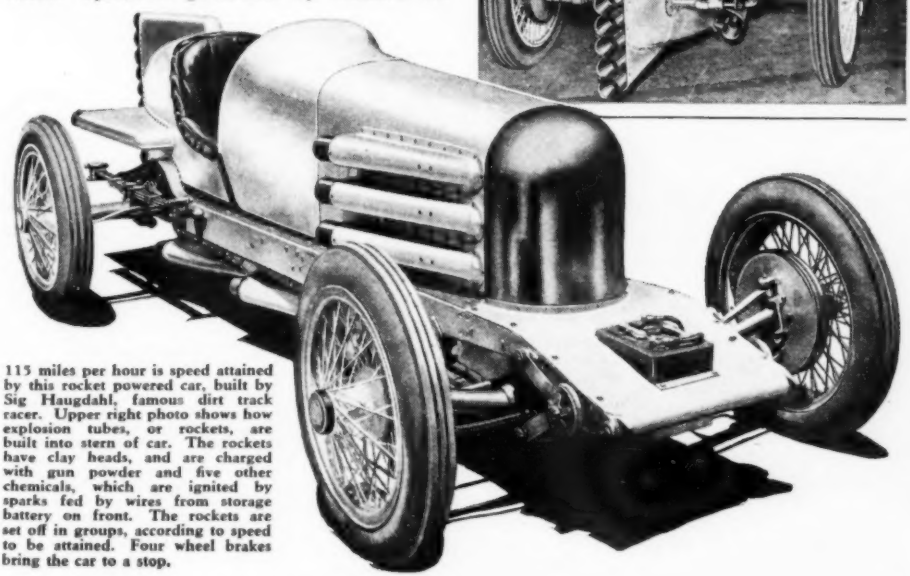
Gunpowder Drives Rocket Racing Car 115 Miles Per Hour on Dirt Track

AMERICA'S first rocket racing car has put in its appearance on the dirt tracks. Designed and built by Sig Haugdahl, famous Norwegian dirt track racer, at a cost of approximately $9,000, the car has a speed of approximately 115 m.p.h., weighs 1,650 pounds and is 12 feet in length.

The racer is propelled entirely by explosive rockets set off by a series of electric wires connected to a rotary switch on the instrument panel. Explosions take place in battery of thirty-two tubes built of the strongest steel and mounted on rear in the manner illustrated in the accompanying photos. Ordinary storage batteries furnish sufficient "juice" to set off the ignition fuses. Speed is governed by number of rockets discharged from the rear.

The body of the car is surprisingly light in weight, being built of aluminum, with all parts bolted down with meticulous care.



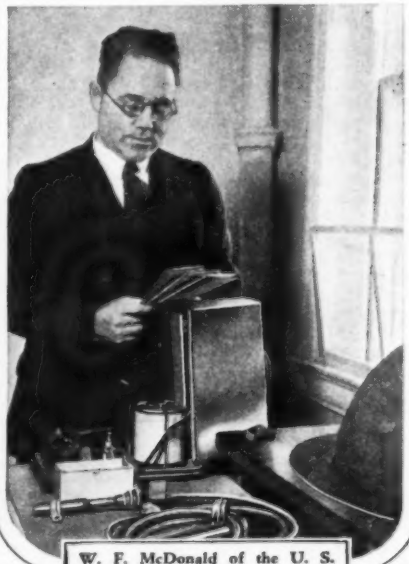


115 miles per hour is speed attained by this rocket powered car, built by Sig Haugdahl, famous dirt track racer. Upper right photo shows how explosion tubes, or rockets, are built into stern of car. The rockets have clay heads, and are charged with gun powder and five other chemicals, which are ignited by sparks fed by wires from storage battery on front. The rockets are set off in groups, according to speed to be attained. Four wheel brakes bring the car to a stop.

SCIENCE GETS NEW

by CALVIN FRAZER

Unusual warmth of the Gulf Stream sometimes brings blizzard weather to the eastern United States. That's one of the odd facts that science has learned about the mysterious current which, originating around the Caribbean Sea keeps northwestern Europe from becoming as cold as Hudson Bay, on the same latitude. Read here how new discoveries may make possible the prediction of weather for several months in advance from observations on the Gulf Stream.



W. F. McDonald of the U. S. Weather Bureau with some of thousands of water temperature records which are charted to study Gulf Stream vagaries.

This sea water thermograph, attached to intake pipe of steamship, traces a continuous record of the water. These records tell the story of Gulf Stream temperatures from day to day.

IN THE Middle Ages a great controversy once arose among philosophers over the question: "How many teeth has a horse?" There was a vast amount of learned argument back and forth, with much quoting of Aristotle and other authorities, but the contestants never really got anywhere until somebody conceived the brilliant idea of examining a horse's mouth!

Weather Attributed to Stream

Something like this has happened in modern times in connection with the Gulf Stream. For generations there has been a great deal of discussion about possible relations between this famous ocean current and the weather on both sides of the Atlantic. Every outstanding spell of freak weather ha. been ascribed in certain quarters to alleged "changes" in the Gulf Stream. On the other hand, a large proportion of conservative scientists have always been skeptical about this explanation of weather eccentricities.

The question has remained an open one because, until quite recently, there has been no means of knowing just when and to what extent the Stream actually changed in any of its characteristics that might conceivably affect the weather. That it was subject to some variations in size, location, speed and temperature was generally admitted, but definite information about these variations was lacking.

Gulf Stream Study Not New

The idea of keeping tab on Gulf Stream changes in order to get a clue to coming weather is an old one. As long ago as the year 1846 an Englishman, Colonel Sabine, suggested the taking of regular observations of the strength of this current at the Straits of Florida as a means of anticipating weather conditions in the Old World, but his project was not carried out.

Light on Gulf Stream

HEAT CONVEYED BY GULF STREAM WARMS NORTH-WESTERN EUROPE AND ICELAND
WARM GULF STREAM AIRS MEETING COLD LABRADOR CURRENTS FORM FOG BANKS
TEPID GULF STREAM MELTS ICE-BERGS
GULF STREAM DRIFT
"LOWS" CREATED BY GULF STREAM BRING DOWN COLD WIND FROM THE NORTH
GULF STREAM
SARAGOSSA SEA
ANTILLES CURRENT
NORTH EQUATORIAL CURRENT

The artist's drawing reproduced above graphically depicts the effects of the warm Gulf Stream current upon weather conditions throughout eastern United States and northwestern Europe and Iceland. Axis of the stream off Florida coast has current of 4 miles per hour, and scientists estimate that heat conveyed averages more than would be produced by burning 2,000,000 tons of coal per minute.

Fogbank like this, endangering North Atlantic shipping, is formed by warm moist air from the Gulf Stream flowing over the cold Laborador current coming down from Arctic sea.

Finally, a few years ago, Prof. C. F. Brooks, now of Harvard University, made a study of recent severe winters in the eastern United States, including the memorable "war winter" of 1917-18, when zero weather and a succession of snow blockades hampered the mobilization of troops and caused much suffering throughout the eastern half of the country.

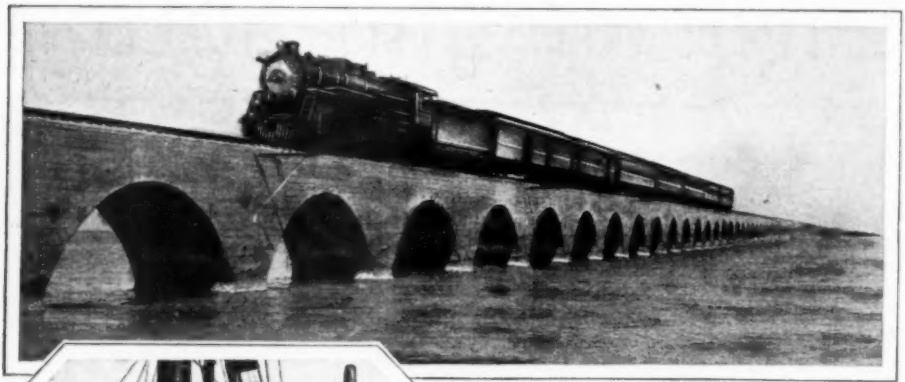
Warm Stream Makes Cold Weather

He found evidence that unusually cold winters coincide with abnormal warmth of the Gulf Stream, and he explained this paradox by the fact that warm ocean water, by warming the air above it, favors the development of intense barometric depressions, or "lows," off the coast. The presence of these depressions results in strong northwesterly winds over New England and the Middle Atlantic States; which, in turn, imply the importation of an immense volume of frigid air from the northern interior of the continent.

Brooks found, however, that the temperature records for the Gulf Stream that, in general, supported his hypothesis were hardly numerous or accurate enough for the purpose of scientific demonstration. They were obtained by volunteer observers, on vessels crossing the Gulf Stream at various points, by the relatively crude process of drawing up a sample of sea water in a small canvas bucket and measuring its temperature on deck with an ordinary thermometer. In the course of a long ocean voyage Brooks checked many such observations and found that they were subject to large errors, especially in cold, windy weather. In some cases the readings were more than 20 degrees too low.

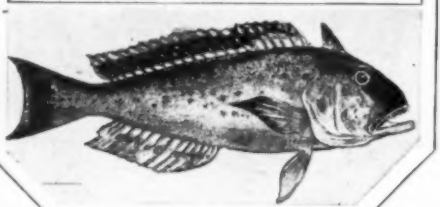
A new era in the study of the Gulf Stream, and of ocean temperatures in general, began with the development of an accurate sea-water thermograph, which is attached to the intake pipe whereby water is drawn into a vessel for cooling the exhaust steam. This instrument traces a continuous record

Billion Tilefish Killed When North Wind Blew Gulf Stream Off Course



Alarmists sounded warning that construction of this Key West viaduct would obstruct flow of Gulf Stream and freeze out population of northwestern Europe. The structure, however, was not large enough to have any influence on current.

Lowering the Pillsbury current meter from survey ship "Blake" to measure speed of the Gulf Stream.



Shift of Gulf Stream sometimes wreaks havoc on marine life. Fully a billion tilefish like this one perished in 1882 when warm water of the stream was blown from its course by north winds. The species was nearly exterminated by the disaster.

of the temperature of the water about six feet below the surface, and its indications are not affected by wind or weather.

One of these instruments was installed, at Brooks' suggestion, on a car ferry making daily trips across the Straits of Florida between Key West and Havana. Its records, combined with records of the speed of the current, as determined from the plotted drift of the ferry, furnished for the first time a fairly accurate idea of the amount of heat carried by the Gulf Stream each day from the Caribbean and the Gulf of Mexico into the North Atlantic Ocean.

More recently, in accordance with a cooperative undertaking of the Weather Bureau, the American Meteorological Society and other organizations, about a dozen steamships that cross the Gulf Stream in various latitudes on their regular voyages out of New York and other ports, have been equipped with thermographs and are now furnishing accurate "cross sections" of Gulf Stream temperature.

Path of Stream Varies

As at that point there is a sharp contrast in temperature between the Gulf Stream and adjacent waters, the thermograph records reveal the size and location of the Stream from day to day. Thus instead of the vague rumors heretofore published in newspapers to the effect that the Stream has "changed its course" we now have positive information about any such changes that actually occur.

Recent records have shown, for example, that south of Halifax, while the width of the Stream remained quite constant, its northern edge was sometimes within 230 miles of the coast and at other times as much as 420 miles away from it.

Heat Conveyed Is Tremendous

The thermograph records serve the additional purpose of providing a check on the accuracy of the observations made by the bucket method on hundreds of vessels navigating in the western Atlantic, the Gulf of Mexico and the Caribbean. Such observations are reported at the end of each voyage to the Weather Bureau which, after applying suitable corrections, plots them on daily charts.

The heat conveyed by Gulf Stream waters from the torrid to the temperate zone is estimated to average more than would be produced by the burning of 2,000,000 tons of

coal a minute, and even after a journey of several months across the Atlantic the warmth imparted by this current to the atmosphere and carried eastward by the winds greatly tempers the cold of winter in northwestern Europe. This effect is so well recognized that some years ago, when Henry M. Flagler was building the celebrated railway viaduct over the Florida Keys, fears were expressed in some quarters that this structure might affect European climate by obstructing the flow of water through the Straits of Florida. Similar dire results were predicted from the opening of the Panama Canal, which was expected by some alarmists to divert the course of the Gulf Stream to the Pacific Ocean.

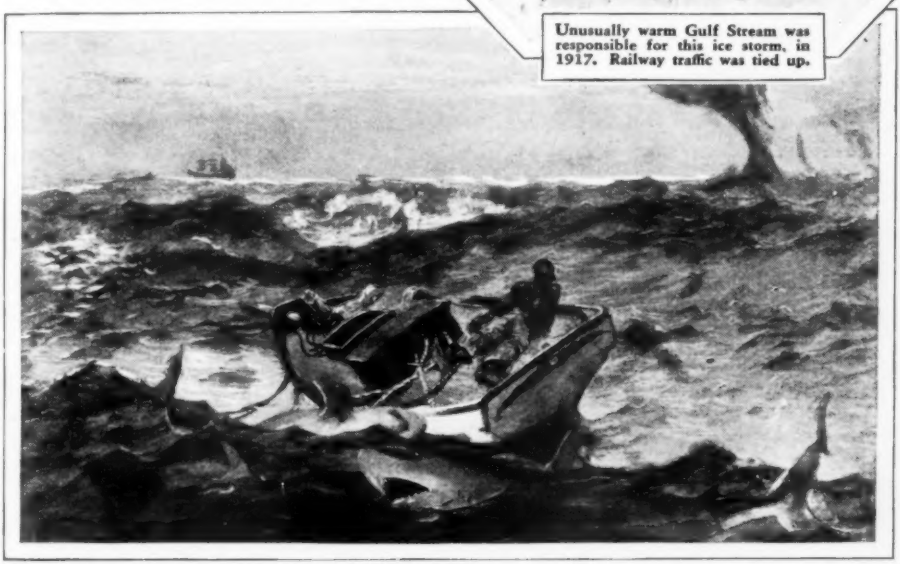
Indicates Future Weather

In neither case were the works of man of sufficient magnitude to produce appreciable effects on weather and climate, but the natural variations in the Gulf Stream are another story. There seems to be ample evidence that changes in the amount of heat supplied by this great ocean river to the North Atlantic are reflected in both American and European weather, and many authorities think that timely notice of these changes, obtained by the new methods above described, will furnish the basis of fairly accurate seasonal weather forecasts.

Apart from their relations to weather, the vagaries of the Gulf Stream are of practical interest to mankind because of their effects on the distribution and abundance of food fishes. This has been brought out in studies recently conducted on the eastern side of the Atlantic, and it was strikingly illustrated off our own shores in the year 1882. In that year countless millions of tilefish were found floating dead or dying on the surface of the water, and their race was nearly exterminated. The disaster was attributed by fishermen to a submarine volcanic eruption but was subsequently traced by investigations of the U. S. Fish Commission to the exposure of the fish to cold water when the Gulf Stream shifted under the effects of strong northerly winds.

Thanks to the warmth from the Gulf Stream Drift, Reykjavik, Iceland, enjoys a mild climate throughout the year, though not far from Arctic regions.

Unusually warm Gulf Stream was responsible for this ice storm, in 1917. Railway traffic was tied up.



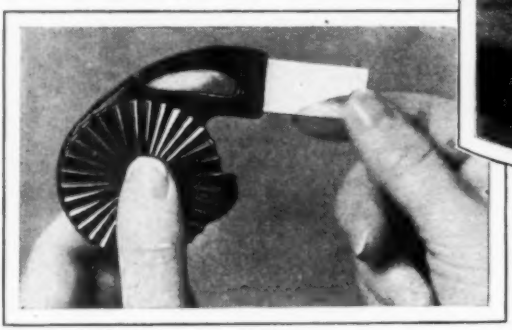
"The Gulf Stream," a celebrated painting of the most famous of ocean currents by Winslow Homer, Metropolitan Museum.

New INVENTIONS Lighten

No dust is scattered around to undo the work of the housewife when the mop is shaken out in this sanitary receiver. Mop is inserted in rubber slot as shown and the door closed down. The handle is then given a vigorous shaking.

Last word in inventive ingenuity is represented in this twin shaker, holding both salt and pepper. Turn in one way and salt is dispensed, turn in the other and out comes a shower of pepper. Device is made of porcelain and comes in assorted colors.

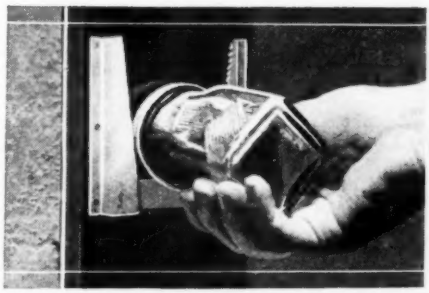
Housewives don't generally like to get up in the early morning to let the milkman know how much milk they want for the day. With this little announcer, however, that uncomfortable task is unnecessary. Simply attach the card to the bottle in the manner illustrated in photo above, and set the dial to indicate the amount of milk you want. The milkman reads the dial and is governed accordingly. Device is made of durable pasteboard.



Mending tissue for repairing sheets of music and other such materials is now put up in rolls that fit the handy dispenser shown here.

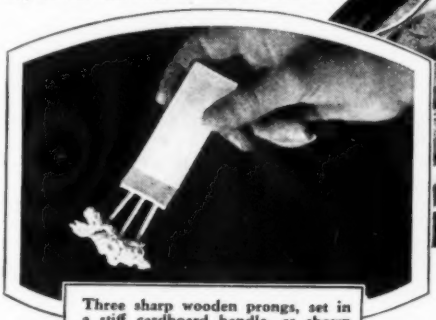
Modern Mechanix and Inventions Editors Will Furnish You With the

the HOUSEWIFE'S Burdens



Having serrated jaws, this V-shaped device, which is easily attached anywhere in the kitchen, removes fruit jar caps and screw caps from large bottles with a minimum of inconvenience, a twist of the wrist being all the effort necessary for the task. Great leverage is secured.

Squeezing the juice out of a lemon for tea or fish is usually a messy business, but not when this device is brought into action. Quarter of lemon is placed in holder, the handles squeezed, draining fruit of all juice without soiling fingers.



Three sharp wooden prongs, set in a stiff cardboard handle, as shown here, spear popcorn kernels with fork action, eliminating buttery fingers. Such a contrivance will prove a strong drawing card for popcorn stands, as an advertising novelty.

Heads of families compelled to carve meat at the Sunday dinner will welcome this new tray, which is equipped with set of prongs at each end to hold the meat firmly in position while it is being operated on. A spring regulates tension.

Addresses of Manufacturers of Household Aids Shown on These Pages

WE CAN'T Be Destroyed

In event of gas attack, defense planes can spread cloud of counter-irritant gas as shown.

In this method of gas defense, a bomb on top of tower is exploded, creating a heavy blanket of counter-irritants which render harmless the gas from enemy planes. This method proved successful on laboratory scale.

by **FRANK GEORGE**

We can never be destroyed from the air, is the decision of government scientists who are developing methods of rendering harmless gas attacks launched by enemy aerial invaders, thus laying the specter of the sudden annihilation of millions of non-combatants in wartime. Read in this authoritative article the defensive tactics being worked out by scientists in government's Chemical Warfare laboratories.

A WAR plane flying over a Maryland hillside dropped a series of chemical bombs that burst like the popping of champagne corks and released a cloud of death-dealing warfare gas. This gas would destroy all animal and plant life.

But even while it was drifting downward a second plane higher up loosed another group of bombs that also popped and released a dense cloud that descended rapidly and overtook the first, and instead of reaching the earth the two discharges thinned and disappeared. No animal was destroyed, no other living thing was harmed.

Government chemists who have been working on the problem of fighting gas with gas ever since the close of the World War have developed several counter-irritants that render supposedly deadly chemicals harmless. The concoctions may be loosed from airplanes, or discharged by means of bombs sent into the air by long range guns trained upon the clouds of death.

Chemical Warfare Service scientists say that the counteracting of war gases with other chemicals has been found to be entirely practical on a laboratory scale, and numerous Government experiments are being made in the tactical use of the counteracting agencies in the field.

The government scientists explain that

by Aerial GAS ATTACKS!

any chemist can evolve a gas that will wither men's lungs or a chemical that will eat flesh to the bone but no foreign government, they believe, has learned how to neutralize or nullify the effects of these weapons.

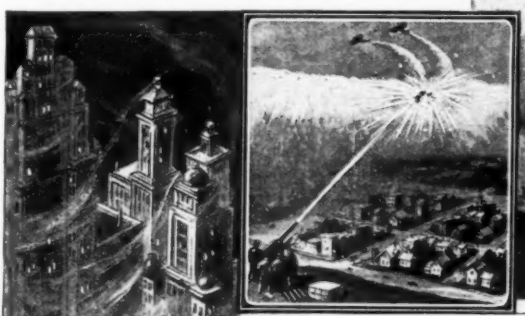
How People in City May Fight Gas

Masks are the commonly accepted safeguard against gas attack but an entire community could not be furnished gas masks in time to be effective against a surprise attack from the air. A large number of noxious gases can be effectively destroyed, however, by mixing relatively small quantities of chlorine gas with the contaminated air, the apparatus for releasing the chlorine gas being similar to that employed in chlorinating city water supplies. Common city water will destroy some types of warfare chemicals and gases.

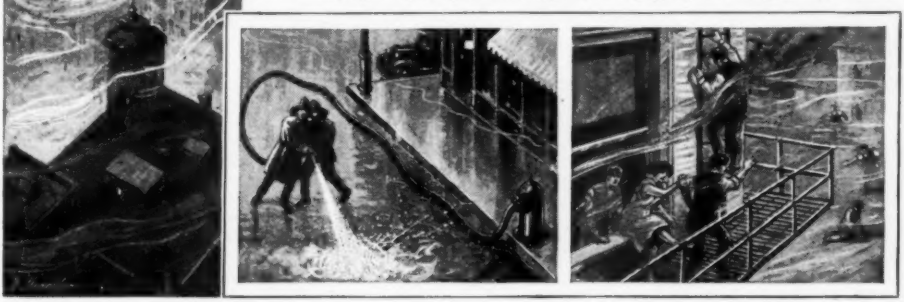
People in cities, according to Major-General Harry L. Gilchrist, Chief of the Chemical Warfare Service, can protect themselves against gases and vapors by going to the upper floors of buildings in which the doors and windows are closed. Liquid mustard, it has been learned, can be destroyed by flushing the streets with water.

Chlorovinyldichloroarsine, a small amount of which on the skin of man will produce death, can be readily destroyed by a city fire department provided with protective clothing, since this deadly preparation decomposes in contact with water. Hydrocyanic acid gas is so light that it is quickly dissipated by swirling air currents in cities.

War Department officials are of the opinion that a city presents certain natural obstacles to gas through the irregular surface of houses, business buildings and streets. Its roof area is large; its street area small. Gas dropped from an airplane must strike in the streets or open ground to be of greatest effect. The swirling air currents common to city streets would dilute and blow away the gas. This in connection with the

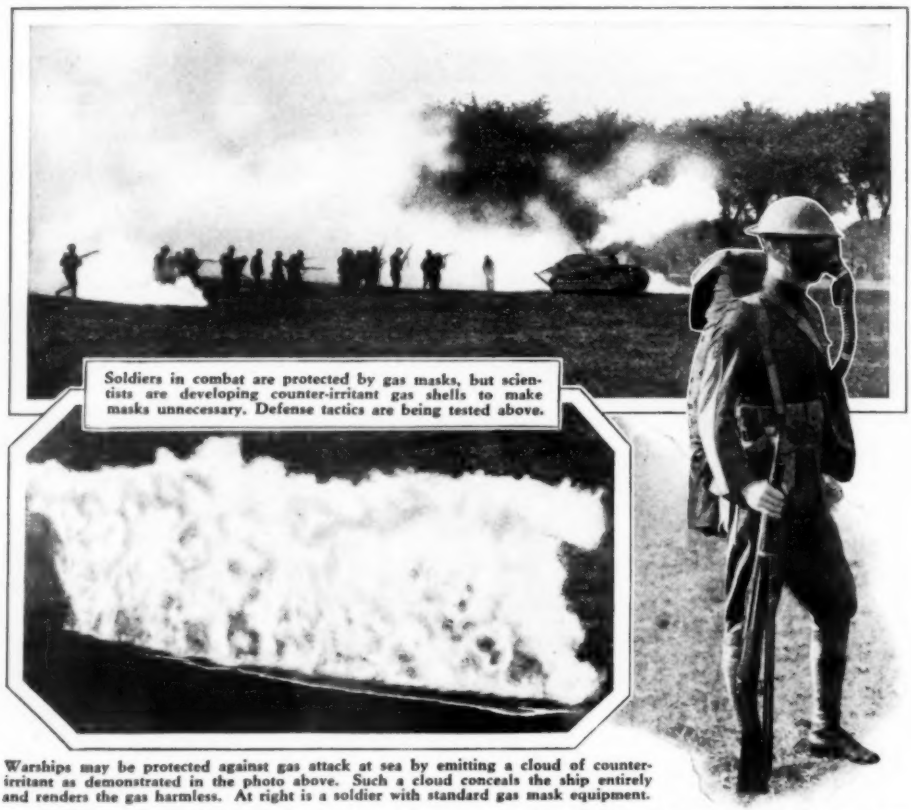


Gas from enemy planes can be dissipated by bombs of counter-irritant dropped by defense planes, or by bombarding the deadly gas pall from ground, as shown.



Government scientists claim that air currents sweeping through city's "canyon" will carry away most of deadly gas, as illustrated at left. Center—Liquid mustard gas can be destroyed, experiments showed, by flushing down streets with water. Right—People living in city apartment buildings can protect themselves against gases by taking to upper stories.

Screen of Counter-irritant Protects Ship Against an Aerial Gas Attack



Soldiers in combat are protected by gas masks, but scientists are developing counter-irritant gas shells to make masks unnecessary. Defense tactics are being tested above.

Warships may be protected against gas attack at sea by emitting a cloud of counter-irritant as demonstrated in the photo above. Such a cloud conceals the ship entirely and renders the gas harmless. At right is a soldier with standard gas mask equipment.

protection afforded by the buildings, it is pointed out, would practically bar any serious damage from the gassing of cities.

The government chemists have developed apparatus that will detect harmful concentrations of gases in the air and which will sound an alarm whenever such gases are present. This alarm in turn actuates other apparatus which releases the counter-irritants.

The equipment is useful also in factories and mines where the danger of noxious gases is ever-present. It is an adaptation of the apparatus used in underground vehicular tunnels to detect harmful quantities of carbon monoxide given off by automobile exhausts, and which opens valves through which the poisonous fumes are drawn and pure air is pumped into the tunnel.

Lethal Chambers Test Deadliness of Gases

Experiments are being conducted, also, with mechanism into which the contaminated air is drawn and destroyed and then passed on out into the atmosphere.

The research has dealt first with a study of what concentrations of deadly gases of all kinds are fatal to human beings. Lethal gas chambers in which men and animals are subjected to the various mixtures are used for this purpose.

The gases include so-called anaesthetics which have a druglike action when breathed, as they are absorbed by the blood; irritants which are not absorbed by the blood but which injure the surface tissues of the respiratory passages, and toxic gases which affect the body tissues and prevent them from absorbing oxygen from the blood.

Scientists Develop Automatic Gas Alarms

Some of the gases are colorless, odorless, and tasteless, and it is these with which the government chemists are principally concerned in connection with warfare use. Carbon dioxide is colorless and odorless, and nitrogen is, in addition, tasteless. As small a concentration of 240 parts of nitrous fumes to 1,000,000 parts of air is rapidly fatal to human beings. Death will result in less than 30 minutes of exposure to a concentration of as little as 250 parts of arsine per 1,000,000 parts of air, or from 25 parts of phosgene. Automatic detectors and the simultaneous release of combative gases are the only feasible means of protection against discharges of this kind.

Aerial Artillery Bombards Deadly Gas Cloud, Thus Rendering It Harmless

Other gases carry their own warning in either odor or taste. Acetylene smells like garlic. Ammonia has a pungent odor but no color. Chlorine is a greenish-yellow gas with a very disagreeable odor. Ethylene is colorless and has an unpleasant odor. Hydrogen cyanide has a taste of bitter almonds.

Alarmists have depicted the wholesale destruction of the population of cities should a fleet of enemy planes launch a concentrated gas attack. Military tacticians reply that in view of present day systems of communications and the fact that the United States has eyes and ears in practically every part of the globe, no large formation of planes such as would be needed to carry a sufficient quantity of the lethal gases could fly unknown against any of our cities.

How U. S. Would Combat Aerial Invaders

A combatant fleet would be put into the air immediately from any of a score or more of army aviation fields throughout the country. Some gas might be loosed by the enemy but not enough to do more than incidental damage. Our own fleet might destroy the enemy by flying above him and using similar gas weapons, and the gas thus used would be dissipated by the winds before it should reach the ground, or, having reached the ground, could be nullified by attacks with counter-irritants.

Practically all scientific branches of the government are cooperating in the study of gases for both war and industrial uses, each research project contributing to the others information regarding the composition and toxicity of the substances. The Chemical Warfare Service is concerned mainly with developing new warfare chemicals and gases and in combatting those which might be used in an enemy attack from the air. Its scientific laboratory is at Edgewood Arsenal, Maryland, where all sorts of animal and plant life are subjected to the harmful substances.

After a process has been perfected in the laboratory it is taken out on the broad Maryland hillsides and put to practical test. The greatest secrecy surrounds the work with warfare substances but the visitor is readily shown the peacetime uses that have been developed for various deadly concoctions as a by-product of the main research. These include the preparation of a paint that repels barnacles from the bottoms of ships, preservatives that safeguard wooden docks and other piling from attack by marine borers, and preservatives that lengthen the life of rubber by more than thirty years.

Smoke Screens Protect Battleships

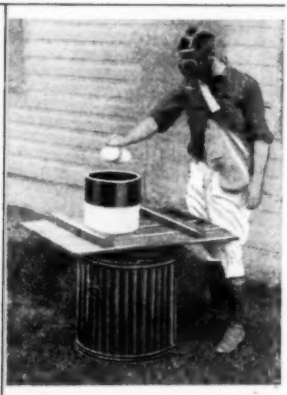
The Army Air Service is developing apparatus which may be used to release gases and counter-irritants from the air, and the Aeronautics Branch of the Navy is constructing devices that produce smoke screens which will protect the crews of battleships from aerial gas attack. It has been suggested that a lethal gas attack from the air would speedily prostrate every person aboard a battleship as the gas would

Here a "patient" is undergoing gas test in the "lethal chamber."

A scene at Government Warfare Chemical Service testing grounds, showing air defense artillery firing shells containing counter-irritant into gas cloud spread by "enemy" planes in sham attack. Long range guns are trained on clouds of death.

Chemical Research Develops Methods to Combat Crop Destroying Pests

Scientists conducting research with mine gases to set up safeguards.



One fruit of research with war gases is the development of chemicals to destroy crop pests like corn borers, boll weevils, etc.

Here are government chemists at work in laboratory testing out gas masks. Through such constant and arduous work, masks are perfected which provide high degree of protection.

penetrate the furthermost recesses of the ship. It would, if the gas were colorless, odorless, and tasteless, and therefore came without warning, and provided further that the ship were not equipped with automatic gas recorders and alarms, and an adequate supply of combative gas.

The Bureau of Mines is conducting research with deadly gases in connection with setting up adequate safeguards in mines and other underground working places, and the Bureau of Standards wants to know how to combat the gases that are common in industries, such as hydrogen gas in soap factories, chlorine in textile and paper manufacturing plants, and ethylene in the synthetic chemical industry.

The Public Health Service is also interested from the standpoint of the health of workers who must handle the various gases, and its scientists have developed tables showing what concentrations of gases will cause headache, irritation to the eyes and throat, illness, and death.

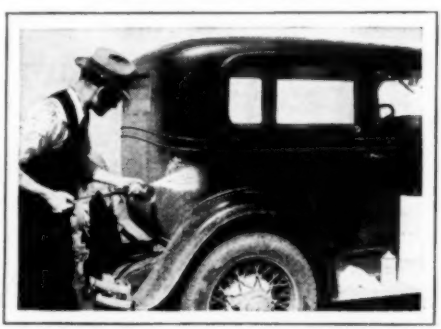
The research with warfare gases is aiding the Department of Agriculture in the development of gases and chemicals that will destroy crop pests, a special laboratory being maintained for this purpose.

New Dry Wash Cleans Autos Without Water by Dissolving Dirt, Grease

A NEW "dry wash" method of cleaning autos now in the market approaches the problem from an entirely different angle. Instead of washing the car with water, all parts of the machine are sprayed with a scientific liquid compound from a special hand spray, as demonstrated in the photo at the right.

This chemical penetrates the dirt and instantly loosens it so that it may be easily and quickly wiped off with a cloth, without any hard rubbing. The "dry wash" also removes traffic film, road oil, grease, etc., and at the same time, manufacturers claim, restores the original color, leaving a smooth dry finish and brilliant lustre.

The cleaning compound will in no way injure the paint on the car.



"Dry wash" compound is sprayed on car as demonstrated.

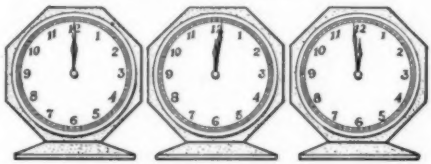
Brain TICKLERS for Puzzle Fans

Here's a new feature for M M readers—a page of puzzles which test your ability to concentrate and see a problem through to an orderly solution. Try your hand on these and see what luck you have.

Revolving Coins

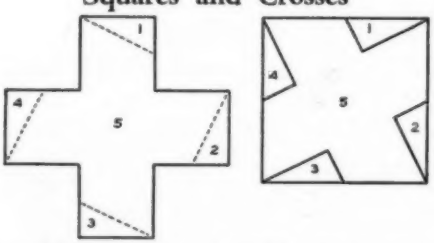
THIS problem is illustrated at the right. Take any two coins of the same size and lay them on the table, touching each other. Then roll one coin completely around the other until it returns to its starting place, as though the coins were wheels, one of which rolled around on the rim of the other. The question is, how many times does the revolving coin turn on its axis in making one complete circuit of the stationary one? You will find that you have a very fertile ground for argument, and the correct answer should come as a surprise.

The Three Clocks

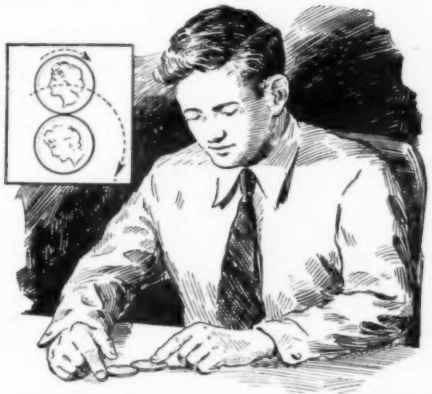


THREE new clocks were started at exactly 12 o'clock noon, April 1, 1898. At noon the following day it was observed that the first clock had kept perfect time, the second clock had gained exactly one minute, and the third had lost exactly one minute. Supposing they kept on at this rate without stopping, on what date and at what time of day would all three pairs of hands point exactly to 12 o'clock? We will add that the figuring out of the date requires a certain amount of step watching.

Squares and Crosses



CUTTING a cross—by which we mean a Greek cross like the one shown above—into several pieces that may be put together to form a square is one of the favorite indoor sports of puzzledom. The usual solution, requiring five pieces, is given in the diagrams shown, that on the left showing the cross with dotted lines indicating the cuts; the one on the right shows the square assembled. The cuts are made from the corners to the middle points of the sides of the arms. Can you perform the feat in only four pieces? We might add that the four pieces are all of the same size and shape, and that only two straight cuts are necessary.



1 2 3 4 5 6 7 8 9 Equals 100

HERE is a puzzle that can furnish a lot of amusement. Place arithmetical signs between the figures 1 to 9, given above, so that they equal 100. You must not change the order of the figures, and all nine must be used. There are several ways of doing this, all of them interesting. Of course, there need not be a sign between each pair of figures. You might start out "1 plus 2 minus 3 times 4," etc., or you might decide to begin "12 plus 34 times 5 minus 67," or something like that. It is a nice additional puzzle to perform the feat using the fewest possible number of signs.

Word-jumping

Word-jumping is a favorite indoor sport. Everyone knows how it is done—you go from one word to another by changing a single letter each time, always producing a good word by the changes. For instance, to go from Cat to Dog in three jumps, you proceed like this: Cat, Cot, Cog, Dog. We offer you an easy one first:

Go from Boat to Crew in five jumps.

Here's another easy one:

Go from Black to White in eight jumps.

Just to make a good finish for this one, try to go from Seven to Eight. It isn't far when you count, but twelve jumps is the minimum.

When you have finished your solutions, turn to page 154 and you'll find the correct answers. Don't spoil the fun by looking in the back of the book before you've done your best.

Amplifier Gives Stringed Instruments Powerful Tones

"Mike" behind violin bridge amplifies tones so that instruments may be better heard over radio and in auditoriums.

THE tones of the violin, from the soft, low ones to the high squeaky ones, sometimes have difficulty in penetrating to the far reaches of a huge auditorium, particularly when competing with more self-assertive instruments. To overcome this inequality Harold Henning, a young inventor-musician of Vienna, Austria, has perfected an amplifier which permits stringed instruments to raise their voices to stentorian dimensions.

The pick-up, or what amounts to the microphone, of the amplifier is attached to the violin as illustrated at the left, being placed just behind the bridge. The tones are raised to immense volume by the amplifier proper.

How Many Fags to Smoke a Day

IF YOU smoke British cigarettes and don't want to suffer from throat irritation and harmful effects of carbon monoxide gas, it is advisable that you smoke no more than five cigarettes a day. Smoking as high as 20 of these cigarettes a day may result in mild carbon monoxide poisoning. This gas, the same as that issuing from auto exhausts, comes from incomplete combustion of the tobacco and the paper.

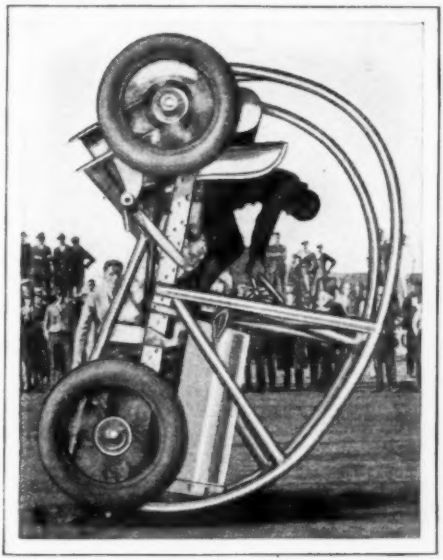
Tanks of Gas for Fighting Oil Fires Are Rushed to Scene on This Trailer

TRANSPORTATION of the cylinders containing gas for combatting oil fires was a problem to "smoke-eaters" until the recent development of a special trailer shown in the photo below. Now, when the alarm sounds, the trailer is merely hooked onto the fire truck and rushed to the scene of the conflagration. Upon arrival, the trailer is unhooked and moved up into the center of the fray, thus permitting the utmost facility in putting down the blazes. The trailer is constructed along the lines of the usual camp trailer, the chassis having slots in cross pieces of body to hold four tanks.

This English trailer for carrying gas tanks to combat oil fires is hooked onto fire engine and rushed to scene of conflagration. Photo shows fire fighters demonstrating effectiveness of the gas in putting down blazes caused by gasoline.

Daredevil Turns Somersault in Specially Built Automobile

ONE of the outstanding events of the International congress of daredevils held recently in St. Louis, Missouri, was an exhibition of automotive gymnastics. What are automotive gymnastics? Well, take a look at the photo at the right and you'll see. The machine which is turning the somersaults has an especially sturdy frame built over the top on which the car rolls in performing its antics. Miss Helen McGee, an 18-year-old racing driver of Peoria, Illinois, is the pilot of the dizzy contraption.



Helen McGee, racing driver, doing somersault in specially constructed auto at congress of daredevils held at St. Louis.

Alcohol No Danger to Kidneys

THE traditional idea that alcohol is bad for the kidneys, the heart and arteries, is exploded by experts of the American Medical Association. If alcohol injures these organs traces of these injuries should be found in the bodies of drunkards at the post-mortem examinations. Instead of this the evidence is that the hearts and kidneys of drunkards are better than the average condition.

Umbrella Makes Bike Rain Top

TO Herr Heinrich Rothbauerin, of Bavaria, goes the credit of devising a rain top for a bicycle. The top, however, is none other than our old friend the umbrella mounted on the frame as seen in the photo below. An upright holds it firm, yet permits it to be adjusted to any angle, so that the rider is well protected, no matter from what direction the rain may be coming.

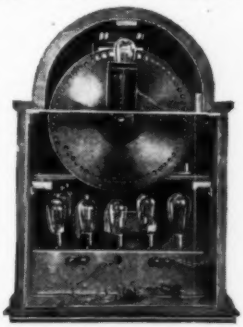
The rider of this bicycle is protected from rain by umbrella mounted on upright that permits easy adjustment.

Lightning Strikes Up From Earth

THE belief has long obtained that lightning comes down out of the skies and works havoc on whatever happens to be in its path. Recent scientific tests prove, however, that all lightning does not originate in the charged thunderclouds. High speed photographs prove that lightning sometimes streaks up from the earth to meet a streak zig-zagging down from the sky. Clouds are charged positively, earth negatively.

Midget Television Set for Home

MIDGET television receivers, corresponding to the midget receivers now in widespread use, are now available for home entertainment. As pictured at the right, the receiver is housed in a small cabinet and is operated with eight tubes, which deliver current to a crater neon tube. The scanning disc has sixty holes and is operated by a synchronous motor.



Rear view of Globe midget television set, showing 8-tube receiver.

The Fascinating Story

The present day motorbike plays a leading role in enforcement of speed laws. Above are shown a squad of Mexican "motorcycle cossacks" demonstrating their prowess as a part of their good will tour in U. S.

Where the first Harley-Davidson motorbike was built—a shed in the back yard of the Davidson boys' home. A single-cylinder, belt-driven job was the first machine turned out.

When Damlier perfected his first clumsy motorbike back in 1885, little did he dream that his brainchild was destined to grow to such a state of staunchness and durability that it could wear out the toughest racing driver. Adopted by the police, the modern version of the powered bike forms the backbone of the speed laws and strikes terror into the hearts of gangsters. This authoritative article tells you some startling facts about the birth, growth and present status of the motorbike.

SAY what you will about the keen thrills to be experienced in the sports of flying and motorboating, motorcycle enthusiasts by the thousands still remain loyal to the powered bike.

Although the automobile has ousted the motorcycle from its erstwhile prominent place on the road, it still holds its own with its competitors in the field of racing, and goes the auto one better by instituting the new sport of hill-climbing.

The story of this two-wheeled contraption is replete with glamor for the mechanically minded, who will be interested to know that the motorbike claims the honor of introducing the first internal combustion engine.

It was Gottlieb Damlier, German motor builder, who in 1885 gave birth to the idea of a self-propelled bicycle after he had succeeded in building the first practical high-speed internal combustion engine. The first Damlier machine bore a close resemblance to the present loop-frame machine, save that the wheels were placed rather close together, giving the rider considerable altitude.

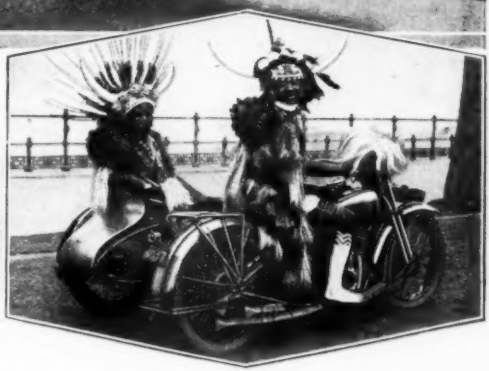
Other points of resemblance with the

# of Your Motorbike

by Fred Schubert

These armored police motorbikes, representing last word in mobility, strike terror into hearts of gangsters.

The thrilling sport of motorbike racing has gathered a large body of followers, and brought fame and fortune to racers. Above is seen a racer in a broadside, a feat of turning in a race requiring skill as well as a sturdy motorbike.



Even these rickshaw boys of South Africa have found the motorcycle a profitable investment. Here two grinning boys are registering approval of their new "taxi," though they had to be bribed to climb aboard the new-fangled contraption.

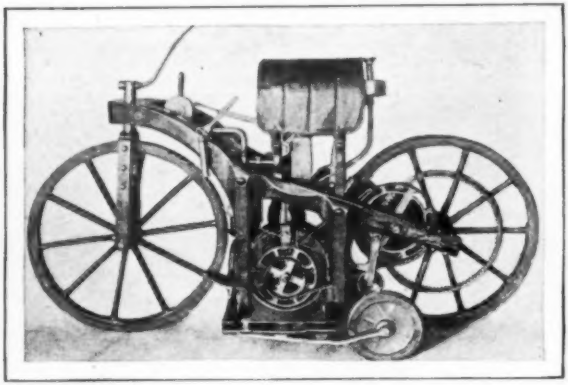
modern machine lie in the use of jockey pulley, or belt tightener principle, and in the steering mechanism, which has not been greatly altered over a course of 50 years.

However, in the drive, several noteworthy changes have been made from the original model. Damlier's machine ran on a flat-belt drive from the pulley on the crankshaft to a larger member on the rear wheel. Today the chain drive is virtually universal—only a few foreign models using the drive shaft idea.

Comical as it may sound to modern motorcycle fans, speed was controlled by permitting the drive shaft to slip or by applying the brake. This crude arrangement was made necessary because of the use of a sluggish vaporizer, a surface carburetor and hot tube ignition.

The pioneers who followed close upon the heels of Damlier made some slight alterations in the original. For one thing, the seat was lowered, so that the rider could rest his feet on the ground when not in motion. The Wolfmueller-Geisenhof, as this "advanced" job was dubbed, powered by a two-cylinder, two-horse horizontal motor,

This Series of Photos Shows Evolution of Motorbike From 1885 to 1931

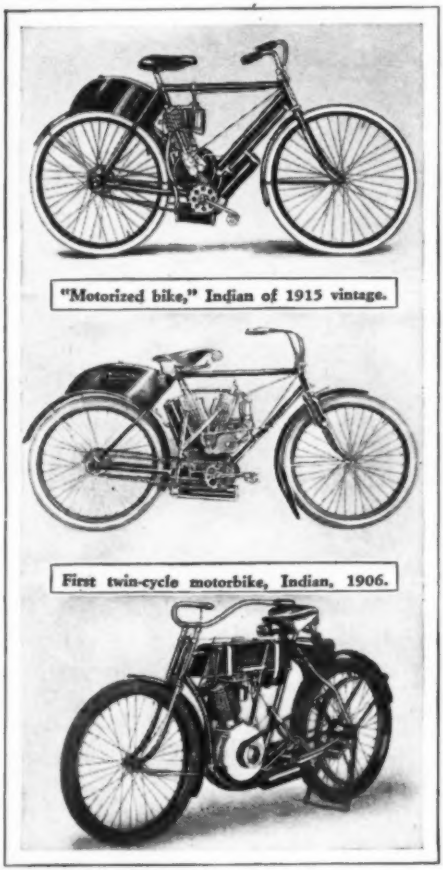


The granddaddy of all the motorbikes—the early Damlier machine. Note the flat belt drive from crankshaft pulley to large gear on rear wheel.

chugged along at the breath-taking speed of 24 miles per hour.

"Advanced" features of the mechanism may sound strange to present day machinists. The drive was direct from the motor cylinder to the traction member—much the same as in locomotive construction. The cylinders were water cooled, the water being carried on a clumsy tank that formed the rear mudguard. The air intake stood out like a searchlight, and altogether the machine was regarded as the last word in efficiency.

Motorcycle history in America began in 1901, when George M. Hendee, owner of a cycle factory, and Oscar Hedstrom, a designer of light racing bicycles, pooled their genius and introduced the Indian, a machine hardly comparable to the one we know today.



"Motorized bike," Indian of 1915 vintage.

First twin-cycle motorbike, Indian, 1906.

One of the earliest Harley Davidsons. Note the belt drive.

It was on May 25, 1901, that Mr. Hendee saw his first finished Indian give an actual road performance of starting, stopping, hill-climbing, and speed work. What it would do was indeed astounding in those days, and it implanted a faith in the two-wheeled motor vehicle that Mr. Hendee never relinquished, even though his early struggles to win approval were hard.

First Bikes Were Belt Driven

1907, the year of the panic, saw the entrance of the Excelsior and the Harley-Davidson motorcycles. The former came on the scene with a single cylinder, belt-driven machine. At the same time Hendee was engaged in developing a multi-cylinder job. Although the Cleveland, the Ace and the Thor arose as competitors, they have since passed into oblivion, leaving the field to the Indian, the Excelsior and the Harley-Davidson.

Competitive tests and races have always been prominent in the development of motorcycles. Long before the first tiny gasoline engine was hung in a bicycle frame there were bicycle races, and before that, stirring contests on the picturesque high wheelers. Naturally enough, as soon as there were a few gasoline-propelled cycles running around, contests of one kind or another followed as a matter of course.

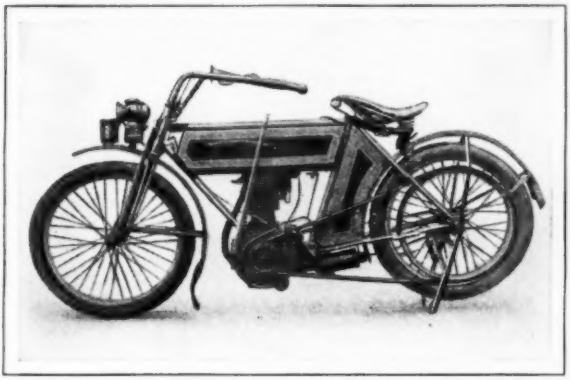
Early Bikes Hit Off 30 M.P.H. Clip

These early contraptions were merely motorized bicycles—crude and unwieldy—with feeble powerplants that could be depended upon to stop at the most inopportune times. The top speed was all of 30 miles an hour but the early race rider got just as big a thrill as the modern speed hound experiences in burning up the road.

Motorcycle races were soon being held on horse tracks all over the country. The staccato crackling of the motors, the dust

clouds, the pungent odor of burnt castor oil, the spine-tingling brushes and slides around corners—is it any wonder that the sport of motorcycling and racing attracted multitudes?

As the years passed, riders developed the technique of broadsiding the corners at higher speeds. More horsepower was built into the motors, along with greater durability and reliability. A great deal more was learned about fuels and lubrication. Frames and forks were reinforced and designed to facilitate handling of the machines at racing speed, and tires were improved.



Here's the first Excelsior to make its appearance in the motorbike world. Speed was controlled by the brake lever or by slippage of the belt connecting crankshaft with rear wheel. Gas head lamp is seen attached to the front fork.

It would take a large volume to record the deeds of these early knights of the handlebars. They contributed much to the development of the motorcycle for the tracks were proving grounds that speedily revealed mechanical defects and weaknesses.

100 M.P.H. Record Set in 1913

A milestone in motorcycling progress was reached in 1913 when Lee Humiston officially covered a mile in 36 seconds on a board speedway near Los Angeles. He rode a two-cylinder Excelsior and was the first rider to attain the coveted speed of 100 miles an hour. The stunt was performed in the course of a 100-mile run—which, incidentally, required more than an hour—and it was years afterwards before any rider succeeded in covering 100 miles within the hour.

That honor belongs to Joe Petrali who came into prominence at the Altoona Speedway in 1925 by piloting a borrowed Harley-Davidson 100 miles in 59 minutes, 47 seconds, which was another of the big achievements in the motorcycle world. But—that's getting ahead of our story!

Racing Came to Fore in 1915-1920

During the years from 1915 to 1920, a second crop of great racing riders was developed, and the king of these was Gene Walker. Gene rode Indian machines year after year. He was amiable and had a keen sense of humor. On the track he was cool, calculating and foxy. His teammate, Shrimp Burns, was a more spectacular rider, willing to take the longest sort of chances. When Shrimp was in the lineup you could always expect fireworks. Red Parkhurst rode a Harley-Davidson and was another stellar performer as were Maldwyn Jones and Eddie Brink.

During the same period, the famous Harley-Davidson racing team was developed, comprising Hepburn, Ludlow, Weishaar, Davis and Otto Walker—the five Iron Horsemen. Whereas Walker and Burns were individual stars, the five horsemen

4-cylinder, belt drive Henderson of 1911.

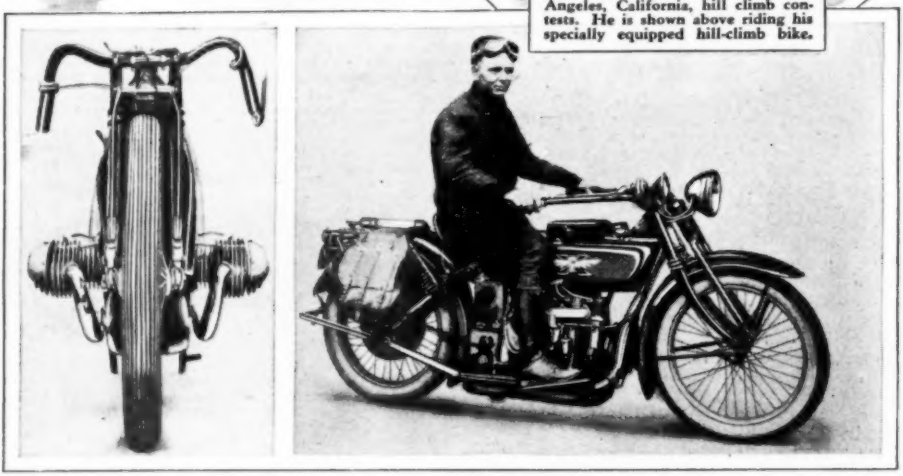
Two-cylinder chain drive Indian of 1918.

Here's latest word in motorbikes—the sturdy 1931 Indian.

Hill Climb Contests Attract Huge Crowds—Victors Win Big Rewards

Joe Petrali, American hill climbing champion of 1928, '29 and '30. He is shown riding his favorite Super X.

Alvin Majors, champion of Los Angeles, California, hill climb contests. He is shown above riding his specially equipped hill-climb bike.



Left. The latest in motobikes—a French machine having front wheel drive with 6-h.p. 2-cylinder motor, V-shaped, with electric starter and interchangeable wheels. Capable of doing 140 m.p.h. Right—Cannon Ball Baker, cross-country champ.

teamed and worked together to an extent never before seen in motorcycling. Time and again the rivals met and the contests were always packed with thrills.

Another branch of motorcycling that has held the interests of fans is intercity and long distance record races. Wells Bennett broke nobody knows how many records riding Excelsiors and four-cylinder Hendersons. Bennett's record from Los Angeles to New York still stands as does his 24-hour mark made at the old Tacoma Speedway in 1921.

Then there's Cannonball Baker who has since won wide fame by driving cars of all kinds hither and thence in next to no time. He got his start in long distance competition on Indians. He and Bennett had many a duel over the road.

Interest in contests of this type has waned for several reasons. Primarily, they were of value because in the earlier days it was a wonderful feat for a motorcycle to hold together long enough for a cross-country trek.

These stunts impressed the multitudes with the durability and reliability of the machines. Modern traffic, however, makes road contests today hazardous and another angle, from the point of view of the manufacturers, is the inconsistency of defying police departments by breaking speed laws and then turning around and trying to sell them motorcycles for law enforcement.

Road Races Passe

No road records of any consequence have been attempted in recent years because most riders know that any modern motorcycle will stand more punishment than the rider himself can endure. In spite of this, though, motorcycle manufacturers are constantly besieged with requests for backing to enable young hopefuls to set new road records. Naturally very few requests are satisfied.

Belfry Without Bells Produces Unique Carillon Music

AND now a belfry without bells! This is the latest accomplishment of electrical engineers, who have developed a carillon producing beautiful bell-like tones which uses neither bells nor tubes. The first electric carillon was recently installed at Lakeview Memorial Park, New Jersey.

The carillonneur who plays the music sits before a 49-note keyboard in a building a thousand feet removed from the belfry tower from which the music issues. When the keys are depressed, tiny hammers strike small metal reeds which are tuned exactly to the various notes. These vibrations are electrically amplified. Volume varies with pressure on the keys, a heavy pressure producing a strong tone. A special clock arrangement strikes the hour automatically.

The belfry shown at the right contains no bells, yet it produces beautiful chime music. A keyboard, as shown above, is manipulated by an operator in a room a thousand feet away from the belfry and the music produced is electrically broadcast from the tower.

Auto Brake Drums Make Chimes

INGENUITY and a half dozen discarded automobile brake drums constructed the unusual chimes shown in the photo below. It is the work of a garage owner in Birmingham, England, who built it during spare time. It is now an advertising feature of his business. It is erected under the roof where it attracts the attention of customers.

Wheel studs form the hammers for striking the drums. Naturally the drums are arranged according to tone, which varies with diameter, thickness of metal, and nature of the material. A simple electromagnetic control system can be installed for manipulating the hammers and producing chime music from the floor. It may be necessary to sort over a dozen brake drums before a set with correct tones is located.

Auto brake drums are the base of the home-made chimes shown here, which a Birmingham, England, garage owner installed under his roof from scrap parts of old automobiles.

Genius Not Found in Slums

THE common idea that genius is likely to flower in unexpected places, men or women of exceptional ability often appearing in inferior families or among the pauper and criminal populations of city slum districts, is scouted by Prof. A. M. Carr-Saunders of Liverpool University. People sometimes object to enforced or voluntary sterilization for criminals, paupers, mental defectives and other inferior individuals, Prof. Carr-Saunders explained, on the ground that genius is likely to appear in these families and that geniuses are so important to the world that no chance to produce them should be missed. This theory is rejected.

You Travel 115,000 Miles an Hour

SITTING quietly in your chair at home, you are actually traveling 115,000 miles an hour! This is the figure arrived at by astronomers, who compute the revolution of the earth around its axis as being 1000 miles an hour, its movement in its orbit around the sun at 70,000 miles an hour, and the motion of the solar system in space as 44,000 miles an hour. In addition there is probably another motion, still unmeasured, of the whole star cloud or galaxy to which we belong. Our position is likened to that of a child on a whirling stool, placed on the platform of a merry-go-round which itself is on a railway car drawn at enormous speed along a track.

Fortune Making IDEAS

How much more pleasant breakfast would be if the diner had at his service an automatic toaster that would spread the butter before delivering it. The heat is there to melt the butter. What is needed is a device to make the application.

Everywhere you turn there's a new invention in evidence, doing an old job in a new way and with a minimum of expense and labor. Yet there are still hundreds of problems calling for solution by ingenious inventors who can turn out a simple, inexpensive device to fill the bill. Here are eight needs that challenge inventors.

1. Non-flattening Train Wheels

THE inventor's field is a limitless one. It is really bounded only by the imagination. The attention of a man might one moment be directed to a delicate piece of mechanism and the next moment to a railroad locomotive.

All of which leads us up to one of the most pressing industrial problems of the day, the problem of the flat wheel. Here is an opportunity for some inventor and he will never be bothered by another depression if he can turn the trick.

Flat wheels cost the railroads of the world many millions of dollars annually because a flat wheel is a menace to safety, to say nothing of the noise it produces when present on street cars.

Flat wheels are caused when the brakes of a heavy vehicle are set too suddenly and too tightly, locking the wheels and permitting them to slide along the surface of the track. What is needed is either some sort of an arrangement that will cut the flattened portion away or some sort of a mechanism that will prevent the formation of the flattened area.

Specifications: The work must be done cheaply and the mechanism used to bring the result about must be within the means of railroads. It should be borne in mind that this device, whatever its nature, would have to be installed on millions of railway cars and it would thus have to be cheap.

Exploitation: Patent rights should be sold on royalty basis to some large producers of railroad equipment.

2. Buttered Toast From Toaster

This problem, needing nothing more than a practical mind and good common sense,

A small, inexpensive check protector for the household would be an aid and safeguard to finances of families.

Flat-wheeled street cars clanking along thoroughfares work havoc on people's nerves. The lucky inventor who puts a stop to this menace will benefit humanity and earn a fortune.

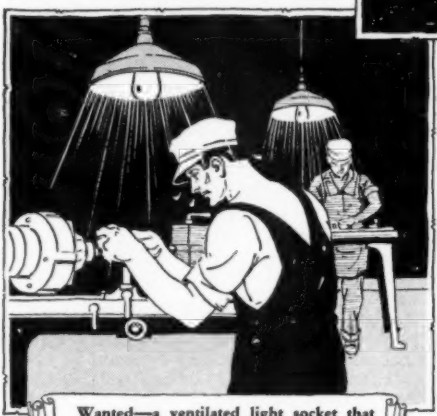
for INVENTORS

by Raymond F. Yates

Instructions to Inventors Wanting Advice

Mr. Yates, who conducts this special department for inventors, stands always ready to give expert advice on patent law and marketing procedure to Modern Mechanix and Inventions readers. When requesting advice, however, do not send models, as they will not be accepted. Your requests will be taken care of promptly and adequately if you merely send a clear drawing and complete constructional and operating data. Stamped return envelope must be enclosed. Address Mr. Yates in care of Modern Mechanix and Inventions, 529 So. 7th St., Minneapolis, Minnesota.

Millions of dollars in wasted current will be saved by an automatic time switch that will turn off the lights when they have been forgotten. There's a grand opportunity here for inventors who can develop a switch to fill the bill.



Wanted—a ventilated light socket that can withstand heat of high wattage bulbs and cut down heat radiation.

Men seem doomed to suffer deplorably from garters that won't hold their elasticity, necessitating constant adjustment. A new method of holding up the socks is needed.

has to do with the production of buttered toast from an electric toaster. What is the need for it? Well, how many of us have sat at the breakfast table and burned our fingers trying to butter toast fresh from the toaster?

I know that I for one have done this many times and each time I have wondered why some ingenious fellow does not get busy and design a device that will cover this toast with melted butter just before the toast is ready to deliver.

The heat is there ready to melt the butter. All that is needed is the mechanical or electrical equipment to make the application.

Specifications: Such a great convenience added to a toaster would make it worth three dollars more to the average person. If this would be the case, then the inventor could feel safe in adding a device that would or could cost as much as one dollar to make. It should spray the toast with butter only at the moment it is ready to be taken from the toaster.

Exploitation: Should be sold outright for $35,000 cash.

3. Safety Check Writer for the Home

Every large business in the United States protects itself against raised checks by a check protector, but these machines are very expensive and can be afforded only by people who write many checks. What is needed is some sort of a simple little device that will permit check protection for people who cannot afford to pay more than a dollar for such a device.

It is a nice little problem and as far as I can see it does not present any tremendous difficulties. Perhaps it is possible to do it

(Continued on page 158)

How Much Longer Will

Like the dinosaur, which grew too bulky for its own good, our mammoth cities are doomed to extinction, say scientific prophets. Disintegration began when Lindbergh hopped the Atlantic, foreshadowing the day of interurban planes, as told here.

In this photo of apartment house fire in New York, note how flames endanger power and telephone cables, strung in network over the entire street.

Here's what happens when subway shoring weakens—half block of roadway collapses in heart of New York. People in surrounding apartments were thrown into panic, but sagging of roadway served as warning so no one was killed.

Gas mains weakened from corrosion constitute one of greatest perils of cities, and grow more dangerous with passage of time. $750,000 damage was done by this blast which occurred in London, uprooting half mile of roadway.

by **RUSSELL J. MORT**

SCIENTIFIC prophets looking into the future proclaim that our mammoth cities, the likes of which the world has never seen before, are doomed to obsolescence. In time, cobwebs will enshroud the cloud-piercing Empire State building and dandelions will grow on Fifth Avenue and Wall Street, they believe, after exhaustive studies into the trend of the times.

What will be the undermining forces responsible for the downfall of our colossal centers of population like New York, Chicago, and Detroit, now packed to overflowing with their teeming millions?

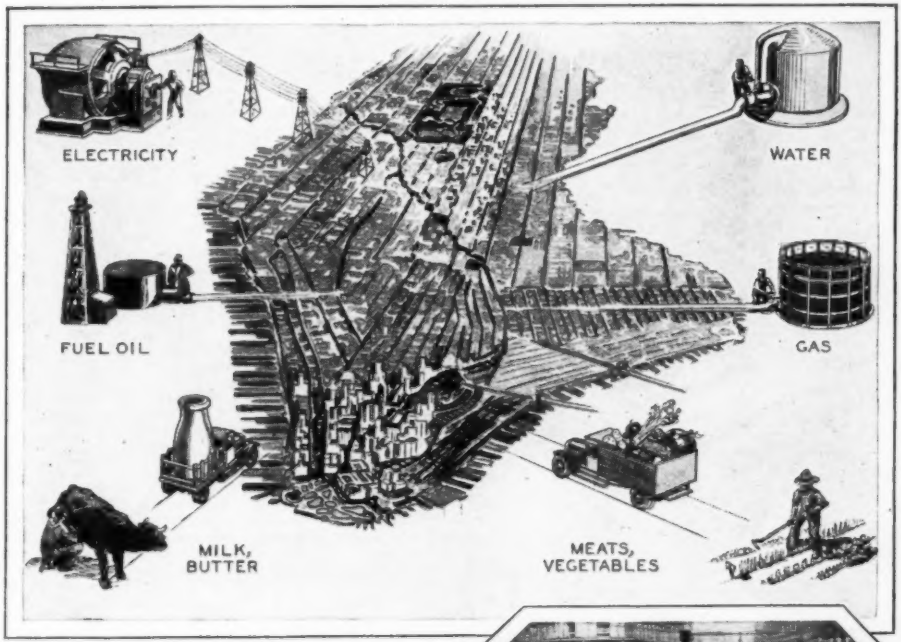
According to such writers as Stuart Chase, when man built the city he built a Frankenstein monster which would eventually turn and try to destroy its creator. The city, Mr. Chase believes, has grown so intricate and unwieldy that it now dominates its helpless inhabitants, rather than being dominated by them.

Congestion, Complexity May Destroy City

Reduced to simplest terms, it will be the intense congestion and mechanical complexity of the city that will bring about its destruction. Little does the city dweller realize the extent to which his life depends on the fragile arteries by which he is supplied food, gas, electricity, water, milk, fuel, and communication with his associates.

Were one of these arteries to be accidentally disrupted, the inhabitants would find themselves facing overwhelming disaster. As our huge American cities are now con-

Our BIG CITIES LAST?



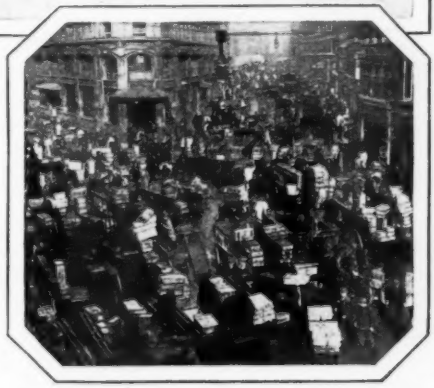
Artist's drawing illustrates how technical experts situated at key positions could shut off supply of basic necessities of life to city and starve entire population to death within three months. Aerial raids in war time might have same effect.

structed, a highly complex network of transportation arteries supplies the aforementioned necessities. Water is piped to every house and office building by an interwoven mass of pipes. Gas is supplied in a similarly snarled system. A labyrinth of tunnels and a lacework of surface and elevated cars conveys the city's millions between their homes and offices and factories. Food and milk are delivered to the housewife's kitchen through a complicated delivery system within the city, to say nothing of the highly systematized methods of importation into the city's markets.

Lives Depend Upon System Maintenance

The lives of city dwellers depend largely upon the orderly working of this maze of transportation channels which supply the urban millions with the basic necessities of life. But what would happen should this overdeveloped system break down under the blows of an enemy in war time or through some great cataclysm which insurance policies describe as "Acts of God?"

A disaster of such magnitude would be difficult to envisage. Mr. Chase, in his book "Men and Machines," asserts that "if 20,000 trained enginemen at the controls of the

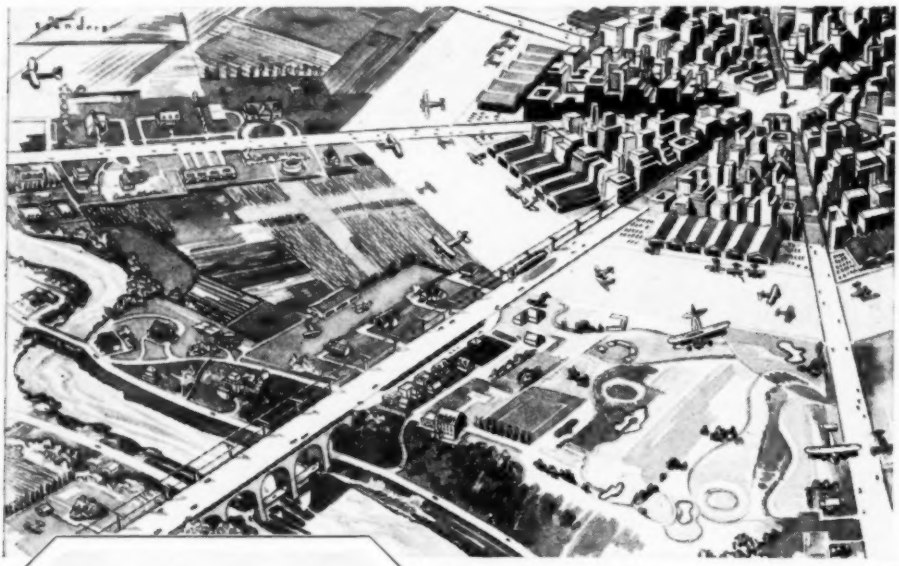


The London fish market. It is through such fragile channels as this that millions of London's people are supplied with food. Closing up of this channel would spell disaster.

system which supplies the country with necessities were blotted out of existence tomorrow, the social and industrial life of the nation would be paralyzed. Mines, factories and public factories would cease production. Food supplies would accumulate remote from great markets. Babies would perish while men and women fought for bread and meat."

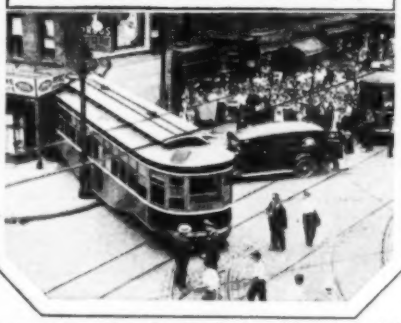
Such a crisis might overwhelm the nation as a whole, but the city would be visited with a far worse disaster. Engineers who

Interurban Planes to Connect Business Centers With Cluster Villages



According to scientific prophets, the city is doomed. In its place will arise the "cluster village" illustrated in the artist's drawing above. Manufacturing and business will be carried on in "trading center" but workers will live in little villages along airplane routes radiating from the skyscraper area. Safe aerial transportation will make this possible.

Aftermath of Chicago fire, which swept entire city, doing $196,000,000 damage, killing 250 people.



25 persons were hurt in this freak accident, caused by fatigued rails. The car left the track, plowed across the road, and smashed into front window of corner drugstore.

have made a close study of the situation claim that technical experts, not over a hundred in number, and situated at key positions, could cut off the city's milk, water, gas, food, electrical and fuel supplies so completely that the whole population would starve to death in three months.

Disasters Occur Even Now

Such major disasters are ever imminent. Every day the city dweller reads headlines of minor disasters resulting from defects in the complex supply system. Every city street teems with possibilities of disaster of which the people are but little aware. Gas mains explode, blotting out lives and sometimes asphyxiating hundreds. Water pipes burst and flood whole blocks, effecting a serious interruption of traffic.

Innumerable deaths have resulted from the cave-in of subway tunnels. In one recent disaster in New York City seventeen people were killed and over a hundred injured. While the disaster evoked big headlines, it passed as an almost commonplace occurrence.

However gloomy a picture these catastrophes may present, engineers believe that the scene will be far more dismal twenty or thirty years from now. The network of gas and water pipes, power supply and telephone lines, and the subway tunnels and vaults, all of which form the throbbing veins of the city's life, are still compara-

Chief menace to health of city dwellers is the smokestack belching black smoke and the automobile exhaust spouting poisonous carbon monoxide. This Chicago scene shows smoke pall hanging over city, cutting off health-giving rays of sun and working havoc on people's lungs.

tively young and substantial. When they begin to age and weaken from fatigue, however, disasters will be blazed across the headlines far more frequently than they are at present.

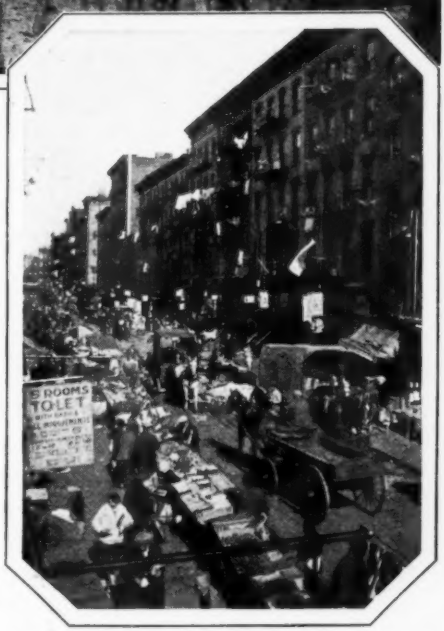
Insulation on the high tension power lines will, as the years pass, wear thin, short circuit, and start cataclysmic fires. Girders and beams supporting elevated trains will suffer fatigue from the constant rumble of traffic overhead, and when they collapse hundreds of closely packed humans in the speeding trains will suffer serious injury or death.

Gas, Water Mains Form Great Hazard

The greatest potential dangers, engineers believe, will lie in explosions from rusted-out gas and water mains, which even now frequently spread havoc in city streets, causing more damage than dynamite. With increasing age will come an increasing frequency of these ruptures.

While modern engineering genius has improved the qualities of the metals which go into the construction of these giant mains, it cannot make over, except at huge expense, pipes which were laid down ten and twenty years ago, and it is these pipes which may be expected to do the damage.

Health of the city dweller is another item that will demand consideration. Hand in hand with the increase in the number and height of skyscrapers there goes a diminution of the amount of sunlight and fresh air accessible—two elements so necessary for

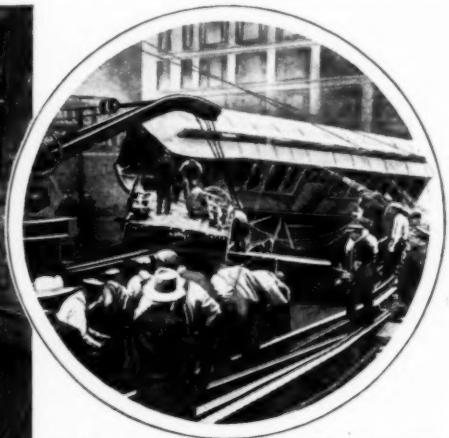


Slums of East Side, New York. Such sores in the flesh of civilization form breeding places for disease and crime, and will go by the board when the city has been torn down. Concentrated areas like this suffer heavily in major disasters.

the well-being of the millions which live and work among the tall buildings. Even now multitudes of tall buildings cut off too much of the health-giving radiation of the sun, while giant smoke-stacks and countless automobiles belch gases which work havoc on the lungs of the city's population.

All the disasters that the cities of the future may suffer will pale into insignificance

Traffic Problems Aggravated by Increase of Population and Automobiles



Girders weakened by fatigue and time were responsible for this "L" accident in New York City.

Above—An accident that the future may expect to see duplicated with increasing frequency. Collapse of this Brooklyn warehouse caused death of two workers. Right—Automobile and pedestrian congestion in Times Square, New York, forms one of city's greatest problems. As autos and population increase the problem will be aggravated. Chicago, Detroit, Philadelphia and other large cities are confronted with similar traffic difficulties.

beside the horrors that may be perpetrated upon civilians in the event of war. Military authorities opine that wars of tomorrow will be fought, not along a continuous front, as was the case in the last war, but behind the lines.

Where, then, are we to live in the future, you may well wonder? When New York, Philadelphia, Chicago and Detroit are but deserted areas of crumbling skyscrapers facing streets overrun with weeds, where will the millions who once inhabited the cities be living?

The answer to this bewildering question may be found in the prophecies of such renowned architects as Frank Lloyd Wright, who foresees a new era in the modes of human habitation. With the disintegration of the city, these prophets say, there will come the development of diminutive villages which will cluster around a trading center, closely resembling the financial district of the present city, where all business and manufacturing will be carried on, but which workers will abandon the minute their labors have ceased for the day.

What agencies will make possible the inevitable growth of this "cluster city?" The chief instrument, it is believed, will be the airplane. The city really began its disintegration the moment Lindbergh set sail for France on his epochal trans-Atlantic flight, thereby proving the practicability of the airplane in spanning long distances with a minimum of peril and time.

While all these prophecies seem fantastic, it must be remembered that even more amazing changes have taken place in the last hundred years; so that by comparison the "cluster city" will not be so astounding after all.

PLANE TALK

Edited by DOUGLAS ROLFE

Junkers PLANE to Navigate Stratosphere

SINCE 1923 scientists of leading nations of the world have been bending their efforts towards developing a plane that could fly through the stratosphere, that section of the upper atmosphere which begins at a height of approximately 7 miles and extends to nobody knows where.

Navigation through this section of the atmosphere has many advantages, providing the disadvantages can be surmounted. At a height of 7 miles or more speeds in excess of 250 miles are possible because of the rarefaction of the air. Another advantage lies in the absence of unfavorable weather conditions—fogs and storms being unknown above cloud level—which afflict aviators closer to the earth.

The latest development in the way of stratosphere planes which partially overcome the difficulties of high altitude flying comes from Germany, where the giant plane, the Junkers JU-52, shown in the photo below, has just been completed. In the stratosphere the air pressure is so low that no human being could exist for a moment, but the Junkers plane guards the pilot against this peril by the use of hermetically sealed tanks whereby pressure outside the body is kept the same as the inside of body.

The fuselage of the plane, which forms a part of the tank, has extremely strong walls to withstand internal pressure. In flight, the pilot is completely inclosed in the pressure chamber, but he has an unobstructed view of the earth, if he can see it, through glass windows. In addition to this protection, unusually heavy flying suits, electrically heated, keeps the warmth of the body inside, where it belongs, and thus wards off the excessive cold.

The plane which will make an assault on the stratosphere is shown in the photo below. It's a low-wing, all metal job and carries an imposing array of meteorological instruments for study of upper air conditions. A short wave transmitter and receiver keeps the pilot in communication with the earth below at all times.

Left—The special flying suit which guards flyers against excessive cold at altitudes above seven miles. Right—The German plane, Junkers JU-52, with hermetically sealed fuselage, which is expected to attain speed of 250 m.p.h. in stratosphere.

Plane Passengers Bailed Out Automatically

When plane is imperiled, cranes on side of fuselage swing passenger seats out to side, then drop them, with parachute attached, earthward. Mechanism is controlled by the pilot.

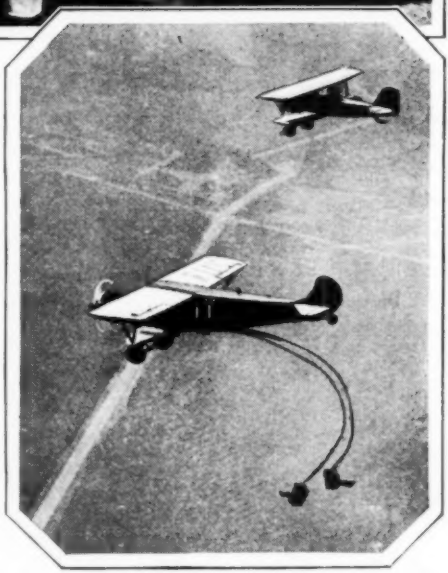
ONE of the most pressing needs of aviation has been a mechanical method whereby all passengers could be simultaneously and automatically bailed out at the psychological moment, that is, when the pilot learns that all hope for saving the plane is lost.

Such a method has now put in its appearance in the aviation world. With the equipment shown in the above photo, it is possible for the pilot to send his passengers on a flight groundward by parachute whether they want to bail out or not.

The seats of this new safety device are suspended from small cranes hanging on the side of the fuselage. When disaster overtakes the ship the pilot operates a lever which swings the seats outward as demonstrated in the photo, then unloosens them, dropping the passenger to earth.

The top of seat is hooked to a parachute, which in flight is carried under the fuselage. When the seat is dropped, the parachute is jerked from its moorings, opening on its way down, so that the passenger is lowered safely on old Mother Earth.

The device proved a decided success when it was put through a test recently over Los Angeles. The two professional parachute jumpers bailed out at 2000 feet.



In test of device conducted near Los Angeles, two parachute jumpers serving as passengers were dumped earthward, as seen in this photo. When seats are released for descent, they disengage parachute from its position under the fuselage, so that passengers are lowered gently to earth without slightest danger. Passengers have no voice in procedure; they are dumped out at moment pilot determines ship can't be saved, and that "bailing out" is necessary.

Glider Driven by Skyrockets Is Launched From a Balloon

GLIDERS have been launched by rubber shock cord, by towing behind automobiles, and by various catapult methods, but it remained for William G. Swan of Aurora, Ill., to devise the most novel system of them all.

He attached his glider to the ropes of a balloon, filled the bag with hot air, and ascended. When far enough above the ground, he cut loose the glider and lighted with a cigar stub three ordinary Fourth of July rockets which had been attached to his ship for propelling power. With their aid he stayed in the air four minutes and landed safely.

Swan plans further flights in which he expects to stay in the air longer by the use of more powerful rockets and by ascending to a greater height before cutting loose. The success of his first flight, which was purely experimental, has encouraged him to further ventures.

This glider ascending under a hot air balloon was kept in the air approximately four minutes by skyrocket power.

Cages for Airplane Gunners

LATEST accessory for airplane gunners is the transparent windproof cage covering the cockpit, as pictured in the photo below. It was first shown at the recent pageant of the British Royal Air Force at Hendon, England, and is undergoing experimental tests to the end that it may be adopted as standard equipment on all fighting planes.

Revolving like the tower of an observatory, the apparatus is said to improve marksmanship as well as comfort by protecting against the powerful airstream to which the head of the ordinary gunner is exposed. A segment through which the muzzle of the machine gun is trained is left open, turning with the machine gun mount. The transparent covering material is of special composition which renders it bullet proof, so the danger of the gunner's being struck down by the enemy is minimized.

Bullet-proof windshield protects the gunner in new British fighting plane. The covering revolves on circular track.

New Garments for Aviators

TWO-PIECE flying suits are replacing the cumbersome one-piece variety, thanks to the development by Army officials of a model which is lighter, more efficient, and adjustable in flight to different temperatures.

Objections to the old "Monkey" winter flying suit were that it was too heavy, was difficult to get into unaided, admitted wind down the collar, and did not keep the wearer warm at below zero temperatures.

The new model has a close-fitting collar held in place by an elastic band. The suit units are flat like a blanket, and are held in place by zippers which are fastened by the wearer. Trousers and coat can be "unzipped" if the temperature grows too warm for comfort during cross-country tours from Minnesota to Texas. Many private flyers are adopting the garment, which is already standard army equipment.

Motorists Check Speedometer by Following Monitor Car

Motorist checks his speedometer by comparing it with speedometer on monitor car while following at even distance.

TO MANY motorists the most important thing on their car is the speedometer, but it has remained for a Michigan auto electric concern to cash in on this little driver's trait. The stunt the concern worked made use of a giant speedometer mounted on what amounts to the poop deck of the car, as illustrated in the photo at the left. The large dial, reading from 0 to 90 m.p.h., has a pointer synchronized accurately with the car's actual speed.

A large sign on the spare tire invites the passing motorist to check his speed against the big dial, which is effected by simply following at a speed equal to the monitor car. Very few are the drivers who can resist the temptation to check their speedometers.

Emergency Gas Can for Motorists

A HANDY emergency gasoline can, for either service stations or motorists, is made by cutting a small round hole near the bottom of a gallon oil can and soldering in a short piece of small tubing, over which is clamped an 18 in. section of rubber air hose. Close the spout of the can by soldering into it a wire loop, which extends far enough out to take the end of the rubber hose while carrying the can. This eliminates the use of a funnel in pouring gas into the tank. The owner's name is painted on the can, and if a filling station a deposit is collected when the can is loaned.

Make emergency can by soldering tubing to bottom to take rubber hose, he'd by wire loop. The device eliminates funnel.

You Need Hard Physical Work

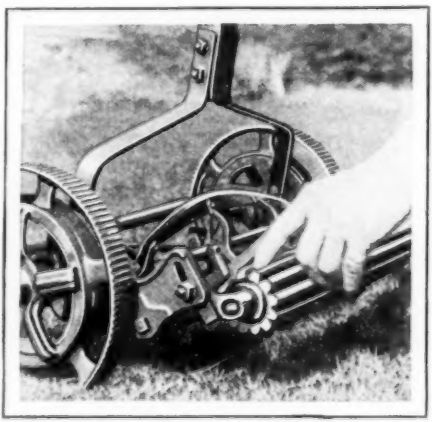
THAT everybody, men and women alike, ought to have plenty of hard physical work between the ages of 17 and 45 but much less of it after the latter age, is asserted by a University of Illinois scientist. At present, most of the professional people under 45 get too little physical work so that they need some kind of active outdoor recreation. Most of the professions, too, he characterizes as too monotonous, another condition which demands mental and physical recreation.

Heart Lives After Body Dies

A HUMAN heart that lived at least three quarters of an hour after its owner was dead is described by a Hungarian physician. A 62-year-old woman suffering from heart disease suddenly collapsed and died. Efforts to revive her failed, but connections to an electro-cardiograph showed that her heart was still beating. The heartbeats continued feebly and irregularly for at least forty-five minutes after the moment of death, as though the still-living heart were struggling vainly to get its machinery again in working order and to revive the body to which it belonged.

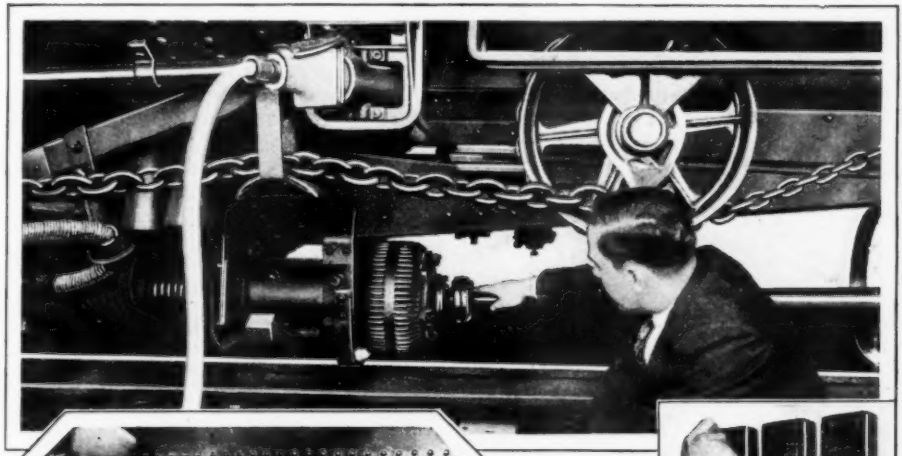
Adjusting Mower for High Grass

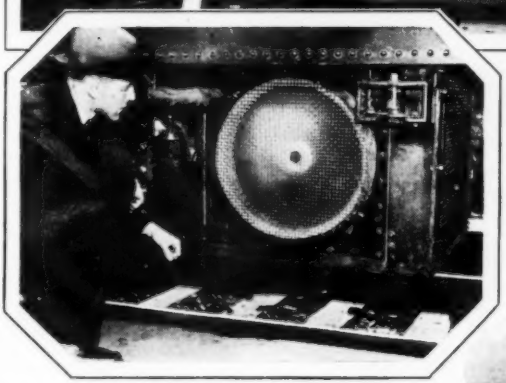
IF YOU find that your mower can't be adjusted to handle grass that has grown too high, try this little stunt. On the roller nail a number of wooden strips, ½ inch square, with the two outside corners chamfered as illustrated in the accompanying drawing. This raises the roller by half an inch and gives a much greater relative cutting height to the blades.



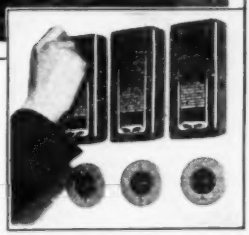
For cutting high grass, nail ½ in. square strips to the roller as shown. This raises cutting height of mower blades.

Refrigerated Train Has Perfect Weather



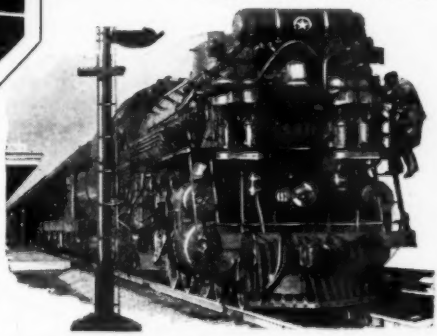


Refrigerant compressor, located under car as shown here, compresses gas refrigerant into liquid, which is exploded through cooling radiation where it once more becomes gas.



Outstanding feature of electric train refrigeration is this automatic clutch, whose function is to keep compressors at constant speed no matter what the speed of the train may be.

The temperature is kept constant with thermostat control devices.



Passengers traveling on "George Washington," shown here, enjoy dustless and cool transportation, thanks to development of the electric train refrigeration system now in service.

MODERN wizards of refrigeration have just completed what will probably rate as the most comfortable passenger train in the world. Dustless, noiseless, windowless, yet filled with fresh, pure air at all times, pleasantly cool in summer and with just the right temperature in winter—such are the conveniences of "George Washington" running out of Washington, D. C., to the South and West.

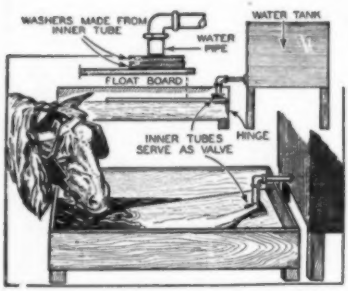
What is responsible for this cooling procedure is the refrigerant compressor, located underneath each car and powered by the car wheels, which, through their axles, are connected to motor generators. The refrigerant, originally in gas form, when compressed and cooled becomes a liquid and is exploded through the cooling radiator, where it once more becames a gas. From here on the cycle is repeated.

All fresh air taken into the coaches is scientifically cleaned and conditioned. The air comes in from the vestibule and consists of about 25 per cent outside air and 75 per cent re-circulated air, filtered and, now thoroughly clean and pure, blown into the car through grilled outlets in the ceiling.

Both humidity and temperature are regulated automatically. Excess humidity in the summer time is condensed by contact with a cool radiator located overhead. In winter time humidity is controlled by means of a modulating valve which allows steam to flow into the air. Thermostatic heating devices are capable of lowering the outside temperature up to 30 degrees, and keeping it there without fluctuation.

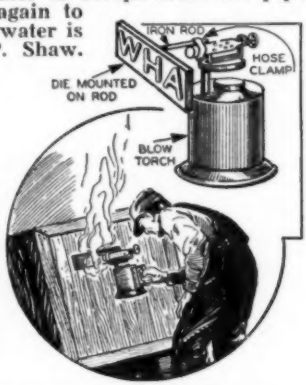
HANDIKINKS

Handikinks department brings you a number of miscellaneous items and stunts each month that are easily made, and which any reader will find useful around his home, garage, or workshop; in fact, any place where there's work to be done.



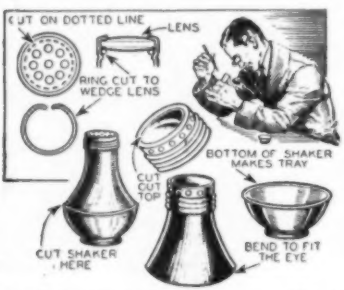
Automatic Valve Keeps Trough Always Full

WITH this automatic valve on the job you don't have to give a minute's attention to task of watering the horses after a day's work. A board hinged to the end of the trough as illustrated in the drawing at the left, does duty as a float, while several old layers of inner tubing tacked on this board at the point of contact with the pipe will serve as a valve. The size of the board, which should be of the lightest wood available, depends upon the dimensions of the trough. When the water is lowered, the inner tube valve permits water to escape from the pipe until the level rises again to normal, and then the water is shut off again.—S. P. Shaw.



Die Mounted on Blow Torch Speeds Up Job

A CONCERN in Phoenix, Arizona, that has long made it a practice to burn their trademark on tools, boxes, and other wood pieces and supplies, found it quite a tedious job heating the iron and stamping each article. The workers decided to try some less laborious method and here's what they did. First they procured a hefty blow torch. Then they laid violent hands on the branding iron and cut off the shank, leaving it about six inches long. Finally they secured the shank of the branding iron to the nozzle of the blow torch with a couple of hose clamps, as illustrated. That completed the branding equipment. In performing the branding, they then simply lit up the torch, heated the die to a dull red, then pressed the latter against the wood.—A. H. Waychoff.

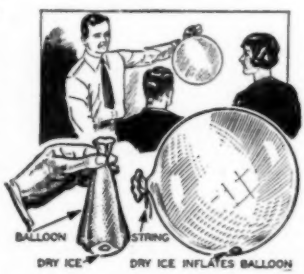


Jeweler's Glass Made From Salt Shaker

A JEWELER'S magnifier that fits the eye like a monocle can be made from the upper section of an old aluminum salt shaker and the customary lens. The top section is cut off at the point indicated in the drawing at the left, and the top of the cap is also cut out. This much done, the next job is to insert the burning glass in place, as illustrated. To hold it firmly in position, insert a wire ring under the glass, then under this make a circle of perforations or dents with some blunt instrument. With the ring sprung in place between the perforations and the glass, the lens will be held tight.
—Dwight Loudermilk.

Self-Inflating Balloon Makes Puzzling Trick

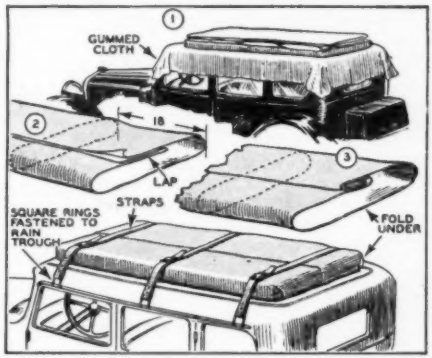
THIS little trick is as mystifying as it is simple. In the performance, you show your friends an ordinary toy balloon. Next, you tie up the opening, and, presto, the balloon starts to blow itself up. The secret lies in the chemical action of the dry ice, which has been dropped into the opening unbeknown to the spectators. The balloon will expand till it bursts, if the chunk of ice is large enough. Otherwise it will enlarge until the ice has all been converted into carbon dioxide. When the trick is completed the balloon can be passed around for inspection.—Burl Knutson.



Page of Kinks for Motorists

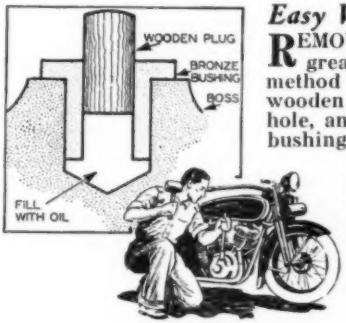
Carry Camp Bedding on Top of Car

ONE of the best places to carry camp bedding is on the top of your sedan. To provide for this method of transportation, you must first fasten some square rings to each side of the roof line, as illustrated in the accompanying drawing. These are to take the straps which are to hold the bedding on the roof. For protection the bedding is wrapped in gummed cloth, which should be long enough to permit about 18 or 20 inches to extend out at either end of the mattress, and wide enough to make the folds illustrated in steps 1 to 4 in the drawing. The final step is to run in the straps and secure the bedding snug to the roof. Everything is out of the way, and you will find this method of carrying does not damage the car.—S. Webb.



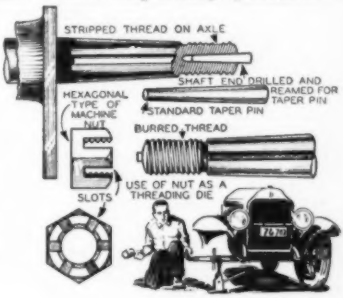
Easy Way to Remove Bushings From Blind Holes

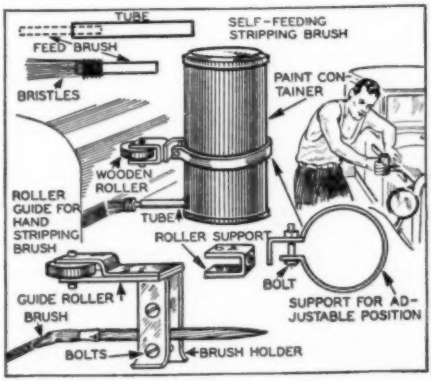
REMOVING bushings from blind holes frequently offers some great difficulties to the mechanic, but here's a hydraulic method that makes the job easy and simple. You will need a wooden dowel somewhat longer than the depth of the blind hole, and of such diameter that it forms a driving fit in the bushing. When you have procured this, you must next fill the bushing about half full of heavy oil, then drive the dowel pin in, as illustrated in the accompanying drawing. The pressure of the oil will exert an upward force on the bushing and drive it out. A few blows with a hefty mallet should provide sufficient power to boost out any bushing that is not hopelessly jammed.—William MacIntyre.



Repairing Mutilated or Stripped Threads

ILLUSTRATED at the right are two efficient methods of repairing mutilated or stripped threads that will prove a great help to any mechanic. If the thread end of the shaft is badly mutilated, a new thread can be cut by the improvised die shown in the lower drawing. This die is made from a shaft nut, slotted as illustrated and case hardened. In cutting the new thread, it is important to start the die squarely on the shaft. If threads are badly worn or chewed up, you can enlarge the shaft slightly.—G. A. Luers.

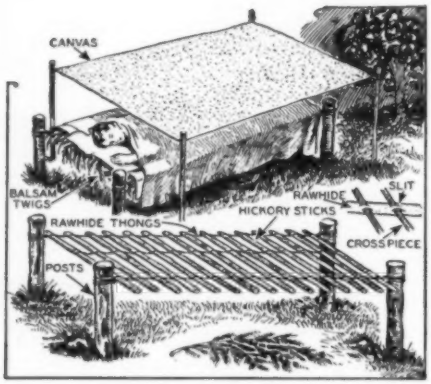

STRIPPED THREAD ON AXLE
SHAFT END DRILLED AND REAMED FOR TAPER PIN
HEXAGONAL TYPE OF MACHINE NUT
STANDARD TAPER PIN
BURRED THREAD
USE OF NUT AS A THREADING DIE
SLOTS



Decorate Your Car With Stripes

UNLESS you have an extraordinarily steady hand, you'll find the job of painting decorative stripes on your car a difficult job. The best way out of this is to rig up the contrivance shown in the drawing at the left. A wooden roller should be attached to the paint can with an iron strap, while at the bottom of the can is soldered the feed tube for the brush. The container can be dispensed with, however. You can simply bolt the brush to the guide roller. With such a support your hand will be steady as a rock and the stripes will form straight and of even width. For a roller you can use a wheel from any old bed or chair caster. The device can also be used in painting furniture—Oscar Wimms.

Camping with all Home Comforts

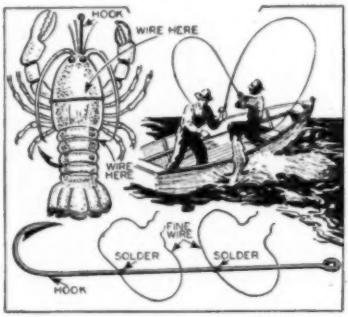


Sleep in Comfort on This Camp Bed

WANT to sleep in comfort, even though you are camping? Then build your bed as illustrated in the drawing at the left. The slats of the mattress can be made from sticks of hickory, oak or ash, about a half inch in diameter, and about two feet six inches in length, the width of the bed. It's advisable to leave the bark on the sticks. From three to six cords of leather thongs are used lengthwise of the bed to hold the sticks in place. The two thongs in each string should be twisted every two inches and a stick inserted, and so on to the end. The stick bed is finally attached to four trees or posts driven in the ground and properly braced to hold them in position. A canvas shelter can be erected as shown.—Robert Lincoln.

Keeping Crawfish Lure Alive on the Hook

DURING the latter part of the summer and during the entire autumn the so-called crawfish is an ideal lure for small-mouth bass and large-mouth bass. Most fishermen, however, have found that driving the hook into a crab soon kills it, making it limp and unattractive on the hook. A method of keeping the crab alive on the hook is shown in the illustration. Two fine hairlike wires are turned around the stem of the hook and touched with solder to keep them in place. The crab is then placed on the hook and the wires are brought up over its back and twisted. By this method the crab is not harmed in the least.—Lincoln Page.



Tennis Racket Makes Fishing Net Frame

MAYBE you don't know it, but one of the best frames you can use for a fishing net is a frame from an old discarded tennis racket. In converting the racket into a net, you'll first have to cut away all the old strings and pull them out of their holes. This much done, you should next procure a net of the required size and sew it in place around the circular head of the racket. It might be a good idea, however, to sandpaper the frame down and give it a few coats of waterproof varnish. Since a tennis racket is built for balance, it can be easily handled when you're trying to land a fish.—Chester Sullivan.

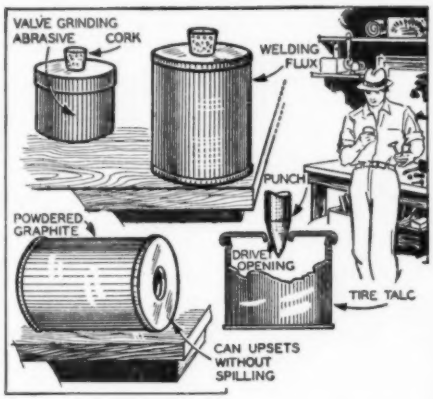
Nursing Nipple Makes Socket Cover

WATER trickling down a light cord in a tent with an opening in the top is sure to cause a short circuit unless some provision is made to keep the socket dry during rains. An ordinary rubber nipple such as is used for nursing bottles will fill the bill here. It fits down over the top of the socket and thus acts as an umbrella against the rainwater. To make a completely water-tight job, wrap a few turns of tape over the point where the wire emerges from the nipple. Of course, the nipple has to be slipped on over the end of the wire, which should, for best results, be waterproof cable.—E. G. Moore.

Stop Waste Effort in the Workshop

Spill-proof Parts Cans for Workshop

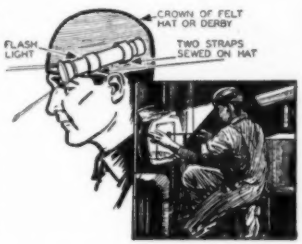
SMALL metal tins of powdered materials used around the service station or garage can be handled most advantageously if the container is opened with a hole in the top center, instead of cutting out the lid. To provide the opening, a center punch can be driven in as far as required to make a suitable size hole, which can then be plugged with a cork. The same principle is used in handling upholstering tacks, small nuts, screws, and other materials handled around the workshop or garage. The small opening in the container top prevents the spilling of the contents when the can is accidentally upset. Thus there is a minimum of waste and confusion due to lost articles. Everything is kept ship-shape and the mussiness of the workshop is avoided.—W. Slosson.



Saw Handles Work with Barb on Blade End

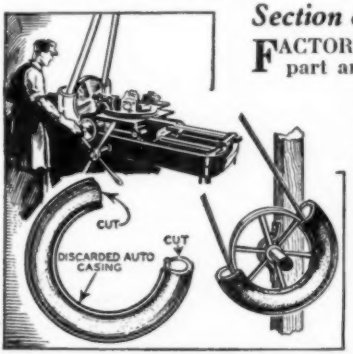
THE usefulness of the ordinary hand saw may be increased if a sharp barb is ground into the end of the blade as illustrated in the drawing at the left. Equipped thus, it will grip lumber in the same manner as scaler's hooked rule. Any home workshop fan who has a lot of cutting to do can appreciate the quick way in which this rule is used to flip and hitch even the longest pieces. Note that the barb grips the edge of the board when the latter is to be turned over, and note also how the hook is sunk into the flat surface of the lumber to pull it up for another cut.—Thomas Moore.

Flashlamp on Head Leaves Hands Free



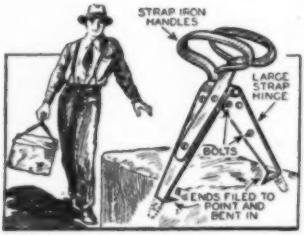
FOR small jobs in close quarters a flashlamp attached to the head is a great convenience, since it leaves the hands free to work. Moreover, the light strikes the object upon which work is being done at the most effective angle, being nearly level with the eyes. As shown in the accompanying drawing, the crown of an old felt hat or derby serves as a headpiece to which the flashlight is attached by means of a couple of straps sewed on the sides.—Hi Sibley.

Section of Tire Casing Makes Efficient Pulley Guard



FACTORY foremen who are worried lest the overhead belt part and injure a worker will find this auto tire guard an answer to their difficulties. First lay hands on an old tire casing and cut it at the points indicated in the accompanying drawing. Then secure it to the post which supports the bearings of the pulley shaft? In places where it is impossible to fasten the guards to the post, suitable hangers may be made of strap iron and fastened to the nearest support. In case a belt breaks such a guard will be found far superior to the conventional clumsy metal or wood guard, as the belt will not whip about when it parts, thanks to the elasticity of the rubber in the casing. In the place where this stunt was first used, the foreman employs old casings as guards for band saw wheels and emery wheels.—Damon Masson.

Miscellaneous Items for Handymen

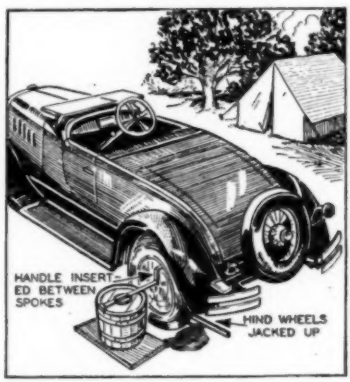


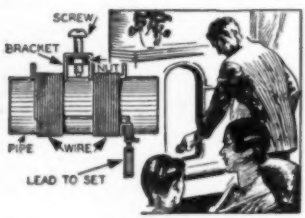
Household Ice Tongs Made From Strap Hinge

A VERY serviceable pair of ice tongs, suitable for handling lumps up to 25 pounds, can be made very easily from a large strap hinge. First, however, you'll have to operate on the hinge by sharpening the ends down to a point, and then bending them inward, as illustrated in the accompanying drawing. Handles are made of pieces of strap iron which have one end bent to oval shape and the other bored to take a couple of bolts. Fasten one of these pieces to each side of the hinge with machine screws. When carrying a lump of ice, grip both the handles at once.—Fred W. Schneider.

Make Your Auto Turn Ice Cream Freezer

ON a warm, sultry day at the lake or in camp, ice cream is a very acceptable delicacy. With the help of your automobile, making it is not in the least a tedious job. Simply jack up one of the hind wheels, blocking the other wheels so that the car cannot roll off the jack. Pour the cream into freezer and pack exactly as though you were going to turn it by hand. Start the motor and put the car into low gear, thus causing the jacked-up wheel to revolve. Now all you have to do is to hold your freezer in such a way that the handle engages in the spokes of the slowly revolving wheel, and let it turn until the ice-cream is finished.—Walter C. Sehm.



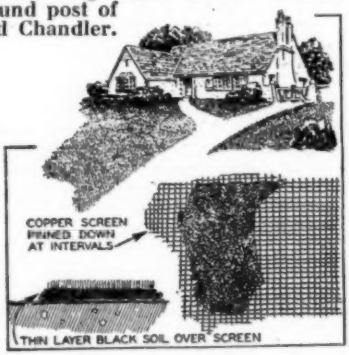


Radio Ground Makes Firm Pipe Contact

TO SECURE a good ground for your radio set, take a strip of copper or brass and form a bracket of the shape shown. In the center section fit the screw, which provides a firm contact when tightened. Leads are taken off and run to the ground post of the radio set.—Howard Chandler.

Screen Laid Over Lawn Exterminates Weeds

A COPPER screening laid over the entire area of the lawn will prove an effective means of exterminating such pests as weeds, dandelions, and the like. These larger plants can't push themselves through the fine mesh, but grass comes up abundantly. To keep the wiry cloth from bulging, its edges should be tacked to wooden stakes at points about the edges and center. The screen over a growing lawn should have a thin layer of black soil over it, thick enough to cover the screen. In a short time the grass will come up lush and green.—Julius Fanta.

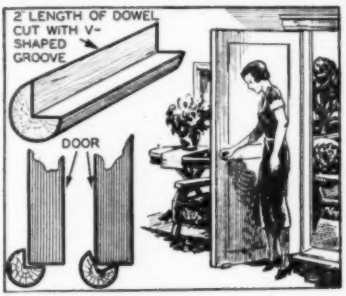


Pack Framed Pictures Safely in Old Magazines

WHEN moving or storing a number of small framed pictures, particularly those done in glass and passe partout, you may encounter considerable danger from breakage. This peril may be avoided, however, by inserting the pictures in old magazines of large size and binding them with cord. How this stunt is performed is illustrated in the accompanying drawing. Four or five pictures can be packed in one magazine, thus considerably facilitating the job of moving.—Hi Sibley.

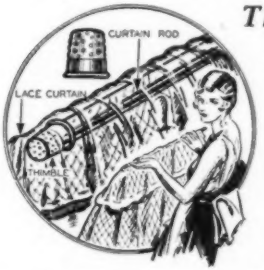
Take Drudgery out of Housework

Simple Little Door Stop Stands Always Firm



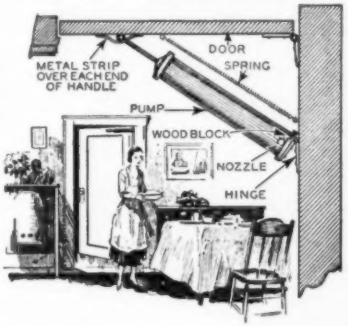
MOST door stops are unsightly and almost large enough to hold open the vault door of the Bank of England. In the home you want a simple little stop which keeps out of sight and which will effectively hold the door at any desired angle. A solution to the problem is simple. A two-inch length of dowel pin, as thick as is necessary, with a V-shaped groove, taking away one-fourth of the material, will efface itself agreeably, but hold open the most stubborn door nevertheless. The accompanying drawing illustrates how cut is made. When not in use it can be slipped behind a table leg.—Everett Folger.

Thimble Saves Curtains

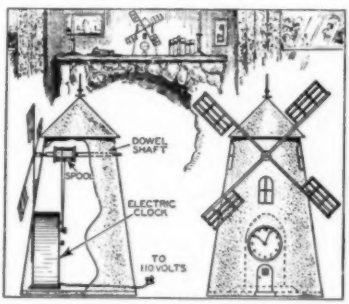


HOUSEWIVES are often troubled, when putting up lace curtains, by having the sharp edges of the brass curtain rod catch in the mesh, sometimes tearing the fabric, especially when it is delicate and therefore costly. In this situation it is advisable to provide a guard for the head of the rod, as illustrated in the accompanying drawing. An ordinary sewing thimble placed over the end of the rod will permit its end to be slipped through hem of the curtain easily and without tearing. With this scheme, the rough edges are covered so that they cannot catch in the mesh.—Bob Gordon.

Door Check Made From Old Auto Pump



A DOOR check for light weight doors, screens and gates can readily be constructed from a discarded auto pump which is in passable working condition. It is not necessary that there be a hose. First, connect a door spring to draw the door shut and fasten the pump parallel to the spring so that the plunger works with the opening and closing of the door, thus allowing it to come shut gently. It will be necessary to bolt an inch wood block to the base of the pump so that it can be hinged to follow the door as it moves. If the door still shuts too rapidly, plug up a portion of the hose nozzle.—Lowell E. Kramien.



Electric Clock Turns Ornamental Windmill

TRY this stunt on your electric clock. Following the design suggested in the accompanying drawing, build a miniature windmill from whatever material you may have available. Provide it with a set of vanes revolving on a dowel shaft. In the base cut out a space to take the face of the electric clock, and on the minute shaft of the latter secure a small pulley. Connect this pulley with the spool on the dowel shaft, and the wind wheels will revolve.—Art Hannon.

Handy Clothes Sprinkler

ABOUT the simplest stunt yet in the way of a sprinkler for clothes is shown in the drawing at the right. It delivers a well-distributed stream of water when shaken, yet doesn't soak the clothes in any one spot. A wide-necked bottle will be found particularly suitable for the stunt. The cork, which may be procured from any drug store, is notched in the manner illustrated, the size of the cuts depending on the size of the spray preferred by the housewife.—Lester Young.

PLANS *for the* GERE

George E. (Bud) Gere, Jr.

EDITOR'S NOTE: Modern Mechanix and Inventions is proud to present these plans for one of the neatest light biplanes that has ever been designed. Unfortunately the how-to-build article could not be written by the designer, George (Bud) Gere, Jr. While testing out an ice sled on January 18, 1931, he was struck by the propeller and suffered fatal injuries. At that time he had completed the ship itself and was working on the motor adaptation. Through the efforts of his father and of aviation friends familiar with Bud's plans, the ship was completed and successfully test flown last fall. Experts who have viewed it have pronounced it one of the finest light planes ever designed, and it will fill the bill handsomely for those readers who have been clamoring for a practical biplane design. The original Gere ship has been acquired by the University of Minnesota, whose aeronautical engineering department is using it in its classrooms as an example of fine design and painstaking craftsmanship.

PART ONE

LATE last fall, shortly before the snow began to fly, a trim maroon and cream biplane was wheeled out on the tarmac at Wold-Chamberlain airport in Minneapolis and made ready for its initial flight. The ship was a beautiful creation indeed, eliciting words of enthusiastic praise from the air-wise onlookers fortunate enough to be among those present.

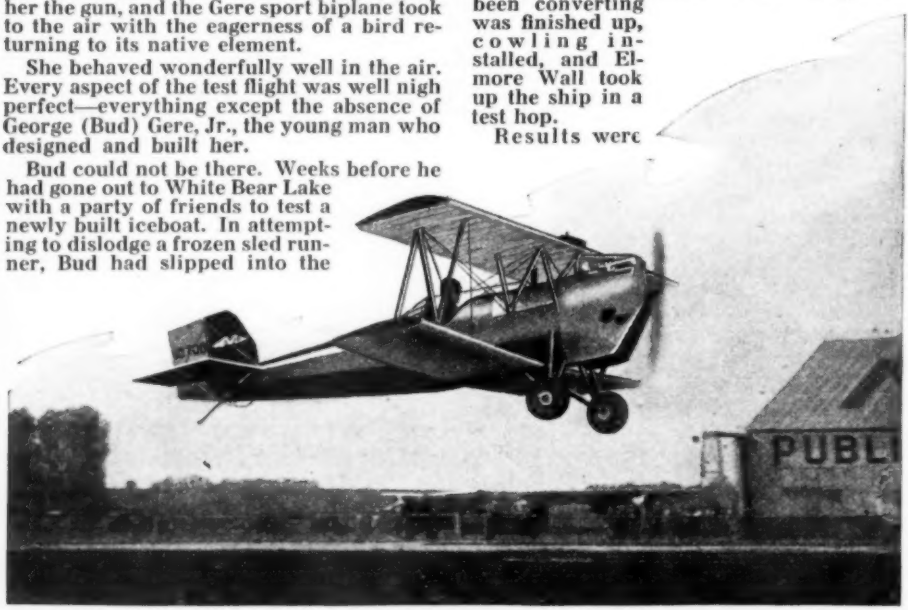
Elmore Wall, well-known Twin Cities pilot, settled himself in the cockpit, gave her the gun, and the Gere sport biplane took to the air with the eagerness of a bird returning to its native element.

She behaved wonderfully well in the air. Every aspect of the test flight was well nigh perfect—everything except the absence of George (Bud) Gere, Jr., the young man who designed and built her.

Bud could not be there. Weeks before he had gone out to White Bear Lake with a party of friends to test a newly built iceboat. In attempting to dislodge a frozen sled runner, Bud had slipped into the arc of the propeller and his injuries had proved fatal.

But the airplane which he left behind him, which had been his labor of love for months, was done except for installation of a motor. Bud's father, familiar with the plans and hopes of his son, carried the ship through to completion with the assistance of friends who had worked with Bud during the hours when his creation was taking shape. The Chevrolet motor which Bud had been converting was finished up, cowling installed, and Elmore Wall took up the ship in a test hop.

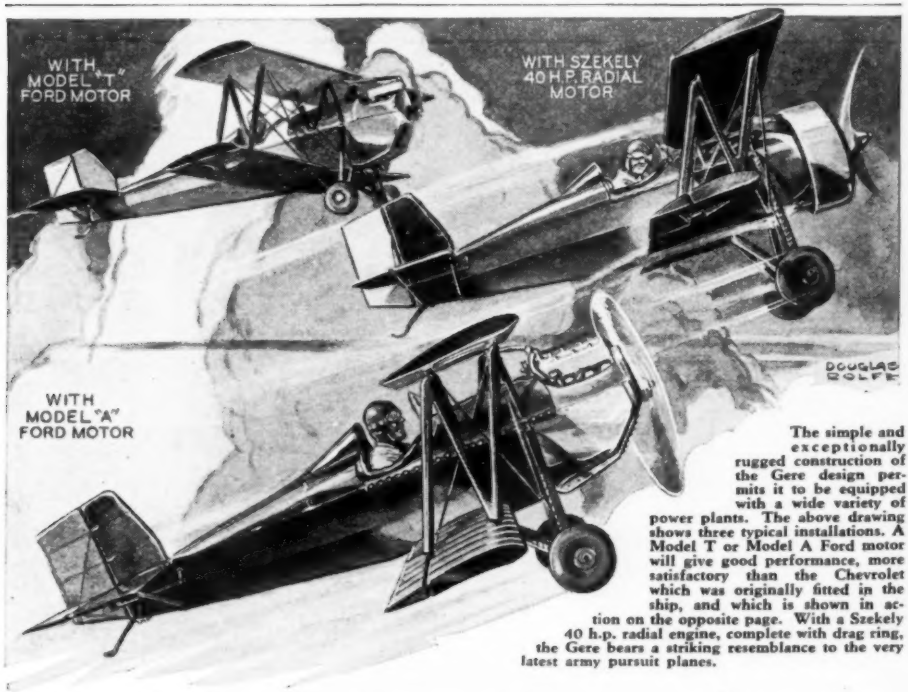
Results were



Pilot Elmore Wall leaving Wold-Chamberlain airport in the little Gere. Note its resemblance to the modern pursuit ship.

SPORT BIPLANE

by DOUGLAS ROLFE



The simple and exceptionally rugged construction of the Gere design permits it to be equipped with a wide variety of power plants. The above drawing shows three typical installations. A Model T or Model A Ford motor will give good performance, more satisfactory than the Chevrolet which was originally fitted in the ship, and which is shown in action on the opposite page. With a Szekely 40 h.p. radial engine, complete with drag ring, the Gere bears a striking resemblance to the very latest army pursuit planes.

so satisfactory that the editors of MODERN MECHANIX AND INVENTIONS take great pride in presenting the complete plans for the Gere Sport Biplane. The ship, as will be seen from a study of accompanying photos, is reminiscent in appearance of the latest type of army pursuit plane. No finer piece of craftsmanship has ever come to my attention. The job is so well built that it would be a distinct credit to both the designing and construction departments of any up-to-date airplane factory.

Now Owned by University

Additional testimony as to the technical excellence of the plane—if any were needed beyond its performance in its trial flights—is afforded by the fact that the original ship has now become the property of the University of Minnesota. Prof. John Akerman of the University's department of aeronautical engineering was so impressed with the Gere biplane that it now stands in his class room where groups of engineering students can study it. Prof. Akerman himself is noted as the designer of several production planes, and his seal of approval is just one more bit of evidence as to the favor with which aviation experts have accepted Bud's ship.

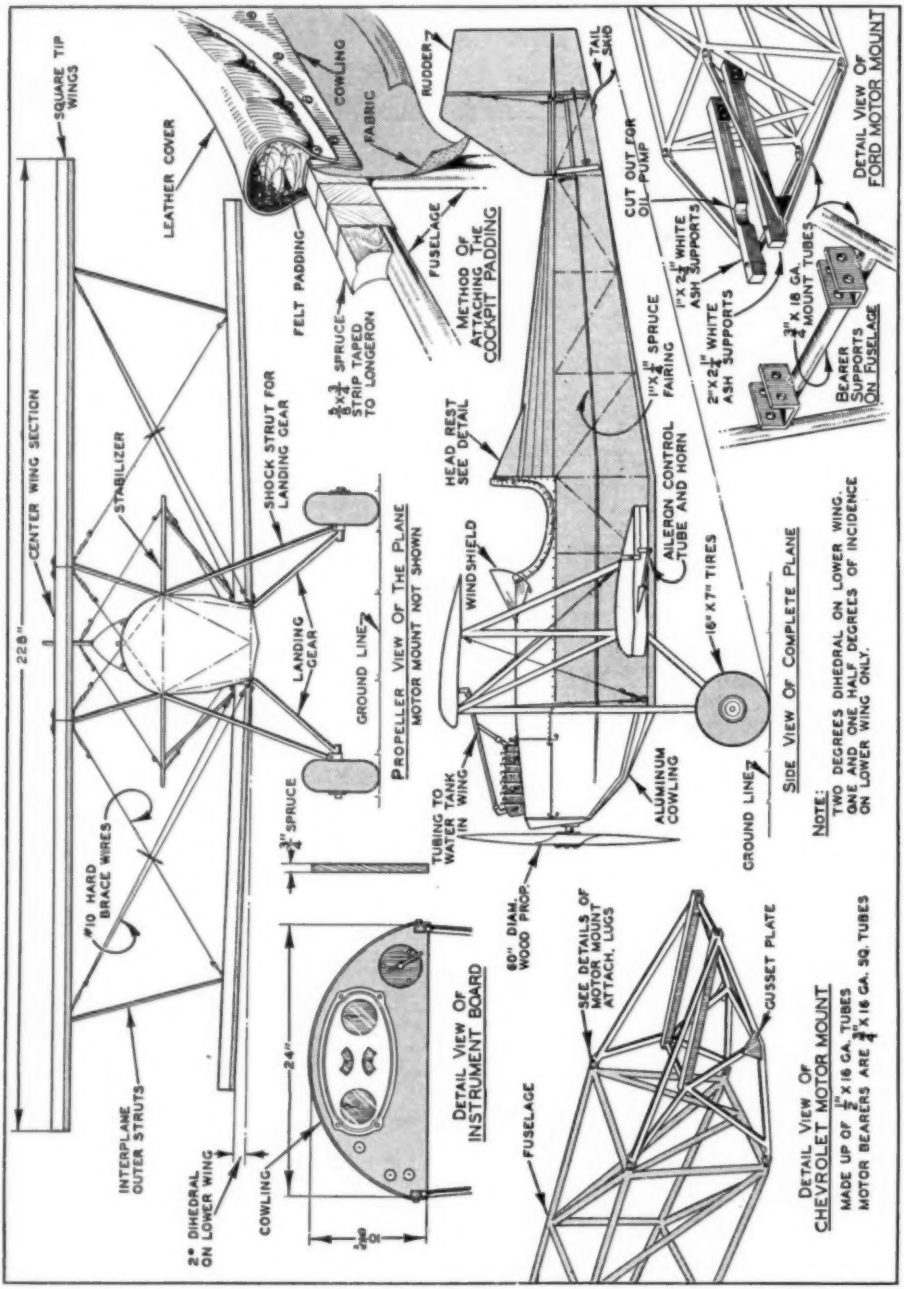
When the editors asked me to prepare a set of plans for M M readers, who have been clamoring for plans of a ship as efficient as the Pietenpol Air Camper, but of biplane rather than monoplane construction, I was both pleased and dismayed.

Plans Presented Step by Step

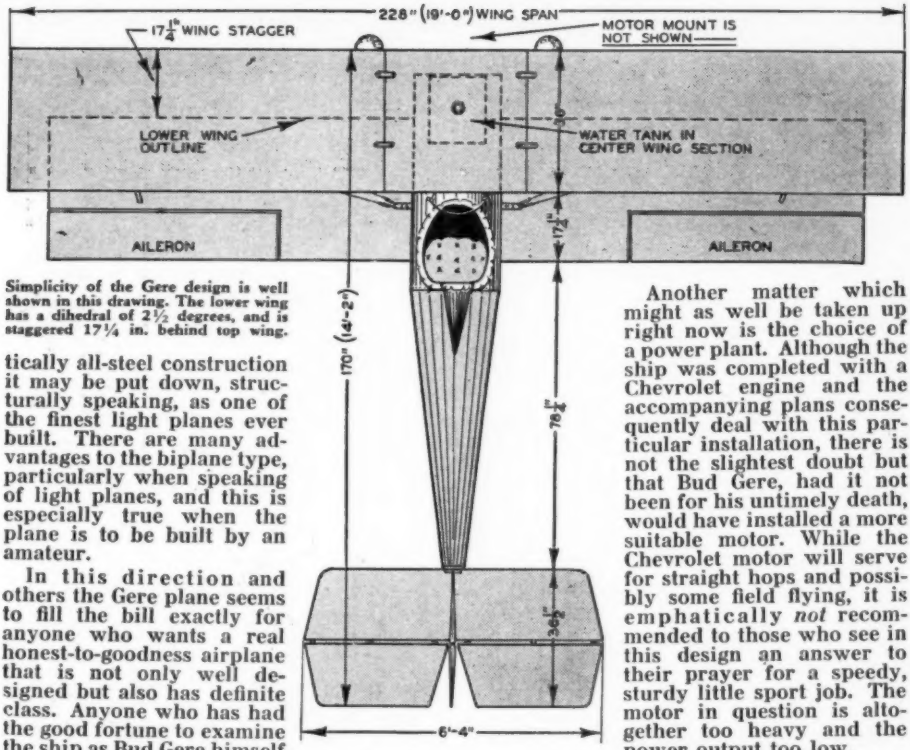
Pleased because from what casual knowledge I had of this ship I knew it to be an unusually interesting airplane—dismayed because I realized that only the builder could do justice to the difficult matter of presenting a "how-to-build" article of his own design. This being impossible, I have endeavored to present in the most lucid and concise manner the step by step procedure necessary to reproduce the Gere design. The drawings and photos which accompany this article have been chosen with great care, the intention being to cover every important detail of the construction in such a manner that they will be practically self-explanatory. To Mr. George Gere, Sr., and others who have been of assistance to me in preparing this article, I wish to extend my thanks.

Before going into the details of the design a few words are in order about the ship itself. As a one-place biplane of prac-

Profile, Propeller Elevation, and Motor Mount of Gere Sport Biplane



Both Chevrolet and Ford motor mounts are given in this drawing. The Chevrolet motor is suitable for short hops and field flying, but it is not recommended to those who want to get full efficiency from the clean lines of the plane. A Model A Ford motor is recommended as being probably the most satisfactory compromise between price and power.



Simplicity of the Gere design is well shown in this drawing. The lower wing has a dihedral of 2½ degrees, and is staggered 17¼ in. behind top wing.

tically all-steel construction it may be put down, structurally speaking, as one of the finest light planes ever built. There are many advantages to the biplane type, particularly when speaking of light planes, and this is especially true when the plane is to be built by an amateur.

In this direction and others the Gere plane seems to fill the bill exactly for anyone who wants a real honest-to-goodness airplane that is not only well designed but also has definite class. Anyone who has had the good fortune to examine the ship as Bud Gere himself conceived and built it is bound to be impressed with the clean lines, the simplicity and ruggedness of construction and the great possibilities of the design. It is difficult to realize that this is the work of an amateur designer and builder. Every detail is so carefully worked out, the finish so excellent and the common-sense attitude of the designer so apparent in every phase of the construction that it would do credit to any reputable aircraft manufacturing concern.

Welding Requires Care

While the straight lines, squared-off wing tips and simple landing gear make it easier to build than many light planes, it is just as well to face facts and recognize that here is a plane employing welded tubing and welded fittings for every important member except the wings. Those who can't do a good job of welding (or who are unable to obtain the services of a competent welder) had better not monkey with this design.

Another matter which might as well be taken up right now is the choice of a power plant. Although the ship was completed with a Chevrolet engine and the accompanying plans consequently deal with this particular installation, there is not the slightest doubt but that Bud Gere, had it not been for his untimely death, would have installed a more suitable motor. While the Chevrolet motor will serve for straight hops and possibly some field flying, it is emphatically *not* recommended to those who see in this design an answer to their prayer for a speedy, sturdy little sport job. The motor in question is altogether too heavy and the power output too low.

We recommend for practical use either the Model "T" or Model "A" Ford engine. These two motors have proven satisfactory under strenuous flying conditions and are furthermore easily adapted to the original Gere design. To supplement this recommendation a suggested Ford motor mount is incorporated in the accompanying plans.

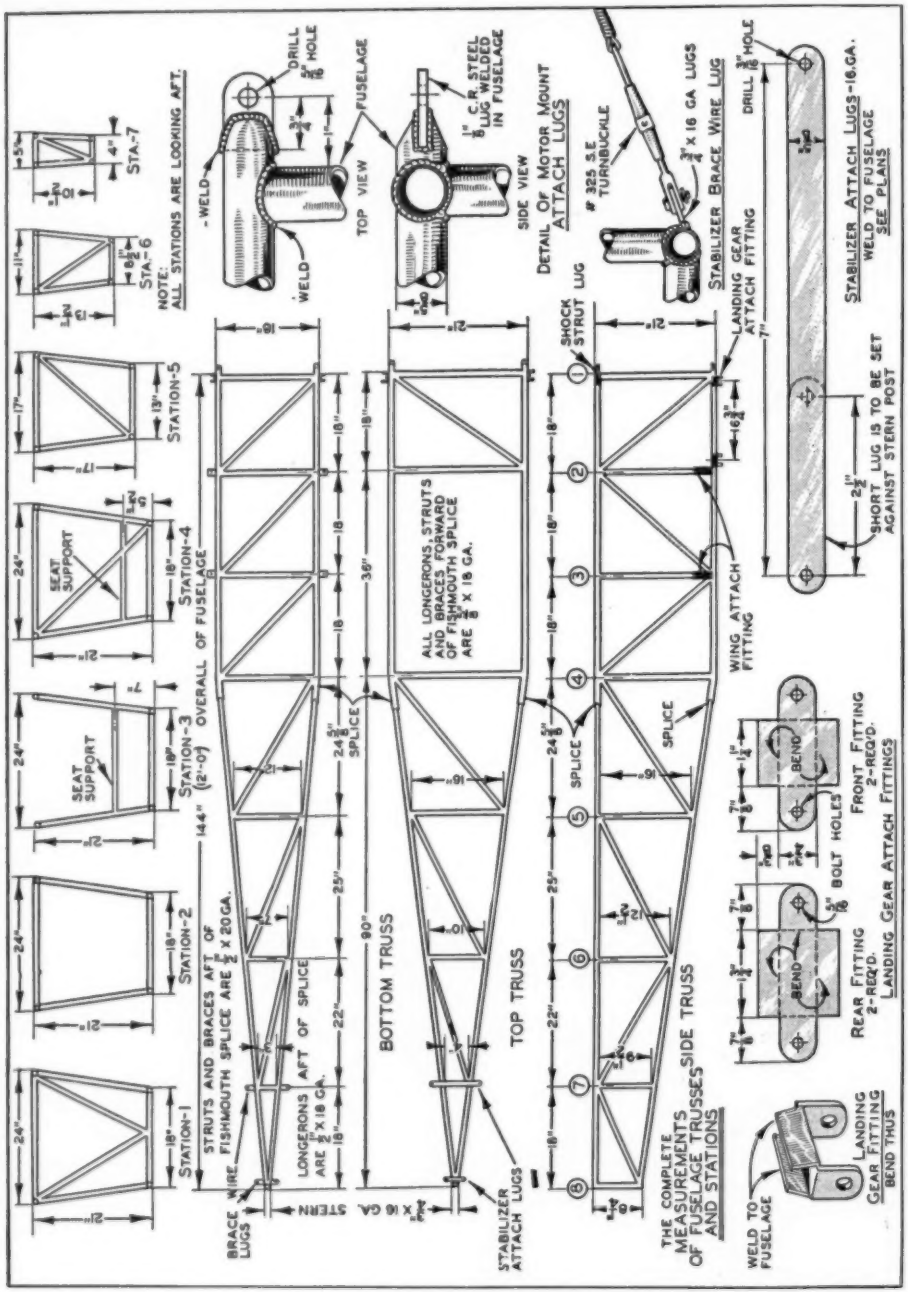
For those who can afford it the Szekely 40 h.p. radial (three cylinder air-cooled) is about the best bet. With this engine complete with drag ring the Gere plane will make one of the snappiest little sporting jobs ever turned out—the sort of ship you could take to the National Air Races and feel warm all over because you happened to be the owner-builder.

Another motor well worth considering, especially for those who would like to build their own power plant too, is the "Packmag Twin." It has ample power, same as the Szekely, and has such low frontal area that it makes an ideal motor for this plane.

SHOP BLUEPRINTS FOR THE GERE SPORT BIPLANE

Complete blueprints made from the original drawings appearing with this article, done up in large size expressly for the home builder, are available for $5 from the Blueprint Department, Modern Mechanix and Inventions, 529 S. Seventh St., Minneapolis, Minn. These prints are about four times the size of the reproductions in these pages, greatly simplifying the building process. They come in a long roll which can easily be cut apart for workshop convenience, and are genuine blueprints that will resist wear and tear. Blueprints for airplane conversion of the Ford Model A motor are available for $1.00; of the Ford Model T, for 50 cents.

Steel Fuselage Simple to Build, But Requires Reasonable Care in Welding



Complete lines of fuselage layout and miscellaneous fuselage fittings are given on this page. Welded tubing is used, since the design is in strict conformity with the latest approved practices in plane construction. Welding must be carefully done. Follow the plans closely and do not depart from them in any respect. You might improve the design—and you might not!

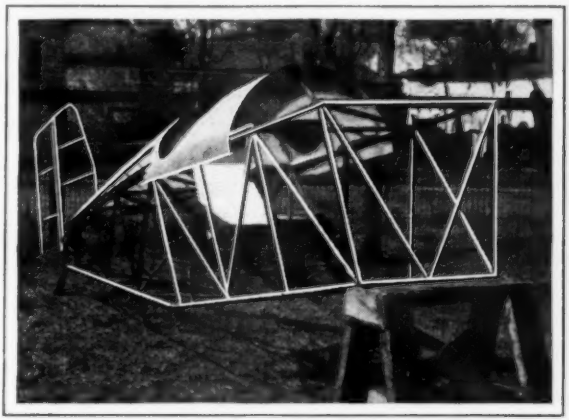
Complete plans for the "Packmag Twin" are available from MODERN MECHANIX AND INVENTIONS blueprint department for $5.00. Castings are also available.

Now, in spite of our recommendation that the Chevrolet motor should not be employed, it is only fair to point out that the ship was actually test-flown with one of these engines and did in fact behave surprisingly well. Pilot Elmore Wall, who conducted the tests, has nothing but praise for the flying qualities of the ship and waxes enthusiastic about the behavior of the controls.

This latter fact is something worth mulling over, as the most persistent criticism of the light plane as a class hinges almost entirely upon its re-action to the controls. As Elmore points out, the very fact that the ship flew so well with a motor weighing 300 pounds (the total weight of the ship, less motor, is only 305 pounds!) and developing a doubtful 19 horsepower is in itself a striking tribute to the soundness of the Gere design.

So, when you build your Gere plane plan on using either a "T" or an "A" Ford engine, or, if you want a young pursuit job, try and lay your hands on a Szekely 40 radial. Best of all, build a "Packmag Twin" and step out with the best of 'em. Complete conversion plans for the Model "A" Ford are published in the 1932 FLYING MANUAL. Plans for the Model "T" conversion appear on page 144 of the June issue of MODERN MECHANIX AND INVENTIONS. Blueprints are available on both these jobs.

You will observe that the subject of converted motorcycle engines has been studiously avoided. They are absolutely unsuited to the Gere design and should be avoided as the plague. Now to take up the actual construction.

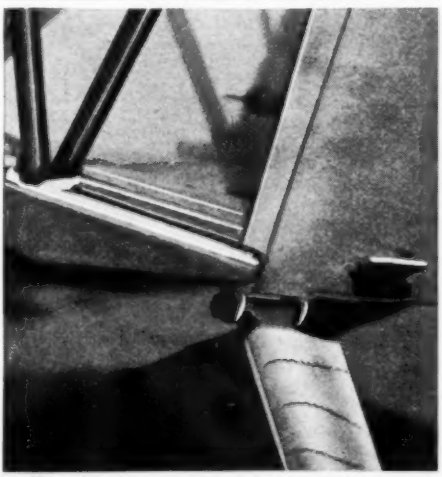


Completed fuselage structure with cockpit fairing and turtle deck in place, but without side fairing. Check with dimensioned drawing on opposite page.

The Fuselage

Building a steel fuselage is a precision job. Furthermore, the welding *must* be done by someone thoroughly versed in the noble art. Slipshod methods, never to be condoned but which occasionally pass muster in minor details, are absolutely *out* when it comes to the fuselage or indeed any of the welded fittings.

Study the plans for the fuselage carefully. All sizes and measurements are given in the drawings and it would be a useless waste of space to repeat them here. It is also of little value to give literal instructions on the



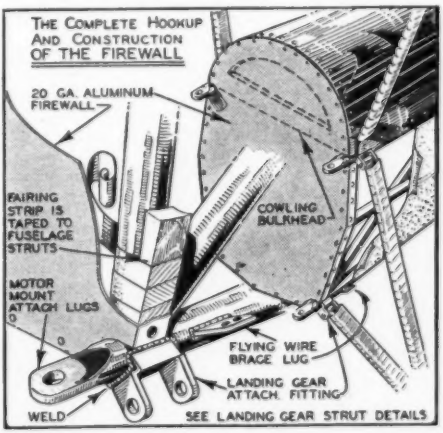

THE COMPLETE HOOKUP AND CONSTRUCTION OF THE FIREWALL
20 GA. ALUMINUM FIREWALL
FAIRING STRIP IS TAPED TO FUSELAGE STRUTS
COWLING BULKHEAD
MOTOR MOUNT ATTACH LUGS
FLYING WIRE BRACE LUG
LANDING GEAR ATTACH. FITTING
WELD
SEE LANDING GEAR STRUT DETAILS

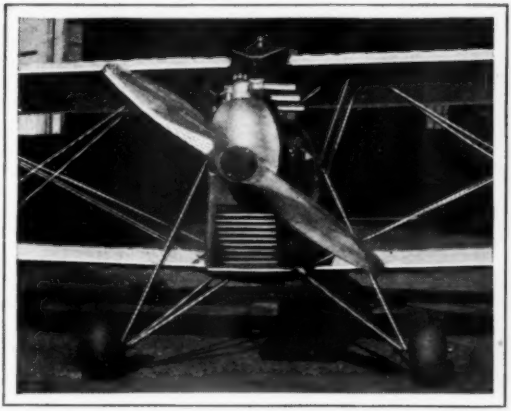
Photo at left shows closeup of landing gear lug and other important members. Drawing above explains construction of these parts and shows a simple treatment of the fire wall.

Landing Gear, Chevrolet Motor Mount, and Tail Skid Shown in Detail

THE CHEVROLET MOTOR MOUNT
Typical Strut End
This method used on all moving strut ends
5/8" aircraft bolts used for bearing pins
STRUT
16 GA. STEEL STRAP
WELD
1" X 13 GA. TUBE REAM TO 7/8"
Front View Of Motor Mount And Landing Gear
Side View Of Motor Mount And Landing Gear
UPPER SHOCK STRUT FITTING
REAR LANDING GEAR FITTING
16" X 7" STANDARD TIRES
16 GA. GUSSET PLATE
Sizes Of Mount Members
1 — 1" X 16 GA. TUBE
2 —
3 —
4 —
5 —
6 —
7 — 3/4" X 16 GA. SQ. TUBES
8 —
RUDDER HORN
BRACE WIRE TO STABILIZER
TURNBUCKLE AND LUG
TAIL SKID DETAIL
SKID IS MADE OF THE 4TH LEAF OF FORD-T FRONT SPRING
1/2" BOLTS
13 GA. SOCKET WELDED TO THE FITTING
TOP LONGERON
1" STEEL-U" FITTING
SHOCK STRUT TUBE IS 1" X 16 GA.
MOTOR MOUNT LUG
Detail Of Shock Strut End
TYPICAL TYPE BOLT USED THRU-OUT
1/2" BOLT AND LOCK LUG
3" X 1 1/2" X 16 GA. COLLAR WELDED TO WASHER
1" X 2 1/2" STEEL WASHER
SHOCK STRUT
Detail Of Landing Gear Axle And The Strut Attachment
1 1/2" X 11 GA. AXLE
WING FITTING WELDED TO FUSELAGE
WELD
16 GA. STEEL STRAP
1" X 18 GA. REAR LANDING GEAR STRUT
FUSELAGE
Detail Of Rear Landing Gear Struts Rear Strut

Complete dimensions of the Chevrolet motor mount, and the landing gear are given on this page. The tail skid is simple, being made from the fourth leaf of a Ford Model T front spring, bent to the shape shown in the drawing.

actual steps necessary to build the fuselage, as this information is available in graphic form in the 1932 FLYING MANUAL. On page 26 in this publication Mr. Pietenpol covers the subject in the clearest possible manner. With the exception of the dimensions, which naturally follow the Gere plans, the procedure is identical to that described so thoroughly by Mr. Pietenpol in the article referred to. He also takes up the matter of the longeron splice which occurs in the Gere fuselage.



Frontal view shows clearly the extreme simplicity of the rugged landing gear, and gives a good idea of its business-like appearance.

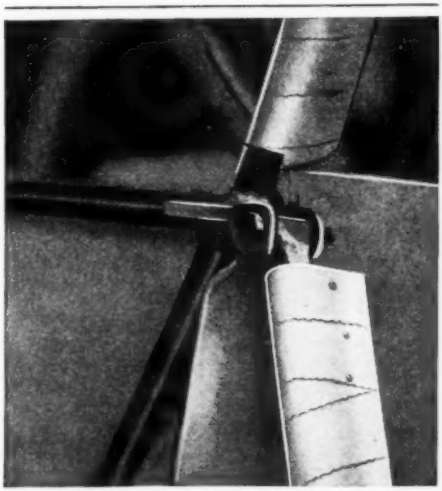
The Motor Mount Lugs

When the fuselage structure is completed the next step is to make the motor mount lugs. These, as can be seen by referring to the plans (see also photos and diagrams on accompanying pages), are made of cold rolled steel (C.R.S.) and are inserted and welded into slots cut into the slightly projecting longerons immediaely forward of station No. 1. In no part of the fuselage is more care essential than at this point. Remember, the entire motor installation depends upon these four lugs and their perfect security!

Miscellaneous Fuselage Fittings

Now we can turn to the lugs for the landing gear, center section struts, flying wires, lower wing fittings, and the tail group. All these are made from ⅛" C.R.S. They are put in their respective places and welded on. In the original design the center section struts are welded directly to the upper longerons at stations No. 1 and No. 2. This *may* be done, but our advice is to make moving joints of these points of attachment, in which case four more fittings should be made exactly like the front landing gear fitting and welded into place on the upper longerons at stations 1 and 2.

Details of the landing gear struts, by the way, are clearly shown both in photographs and detailed drawings illustrating this article. Two front wing fittings and two rear ones are needed. They are all made from 1"x⅛" C.R.S. and shaped as shown in the detail drawing. As the front spar is 3 13/16" deep and the rear spar exactly 3" deep, the fittings should be shaped to accommodate these sizes. Both front and rear fittings are extended and bent as the sketch shows to form lugs for attaching the wing bracing. When all the fuselage fittings are welded in place, the entire fuselage should be thoroughly coated with a good dose of linoil.



Closeup of vertical landing, or shock strut, and upper motor mount lug. Welded center section strut as completed on original ship is shown here. It is suggested in this article that this connection be changed to a moving strut end.

The Landing Gear

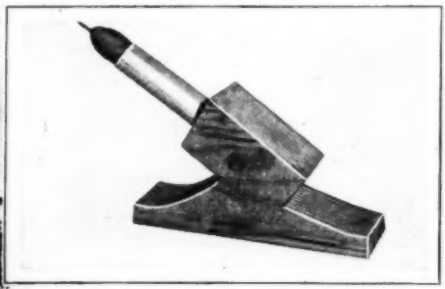
The landing gear is our next point of interest. This is shown in such extreme detail that additional comment is superfluous. The tail skid, a painfully simple member in the Gere design, is also taken care of on this page of detail and should be made and fitted at this time.

The Motor Mount

This is an open question. As this ship is adapted to practically any type of motor *not exceeding 60 horsepower,* the details of the motor mount will depend almost entirely upon the builder's choice of a power plant. A mount suitable for a Ford "A" installation has been suggested. Complete details of this type of mount can easily be obtained from the 1932 FLYING MANUAL, where it is described in connection with the plans for the Pietenpol Air Camper. Similar data can be obtained on the Ford "T" mount by referring to the May issue of

(Continued on page 156)

Perform These STARTLING



Completed dry ice gun, with cork projectile inserted in muzzle ready for a broadside. If you want to make the gun more realistic, add a pair of toy wheels.

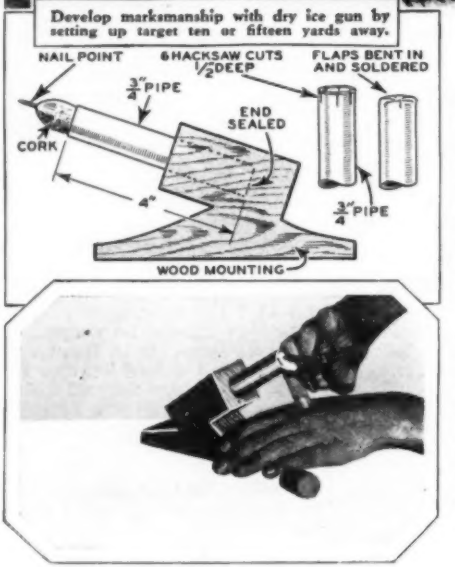


Fig. 1. Plans for constructing the dry ice gun are seen in middle drawing. Gun is loaded at the muzzle with dry ice as demonstrated in photo above. Cork is placed in muzzle.

by DALE R. VAN HORN

Dry ice, which might be called frozen carbon dioxide, lends itself to the performance of some mysterious and startling stunts. As told in this article, it will fire off a toy cannon, propel a model boat, make a spoon squeal like an assassinated pig, and cause a rubber band to writhe as in a terrible spasm of pain.

DRY ICE, or carbon dioxide in solid form, is an exceedingly interesting substance. We know it best as the gas that adds sparkle to our drug fountain drinks. But as a solid, it's something else again, unique in several ways. For instance, carbon dioxide cannot exist as a liquid at normal atmospheric temperatures. It must be either a gas or solid. Only at temperatures below 31 degrees Centigrade can it exist as a liquid.

A couple of years ago it cost something like 20 cents a pound to manufacture dry ice. Today the cost has dropped to 5 cents or less and it is freely predicted that in a short time it will be competing with ordinary ice for commercial purposes. Dry ice is intensely cold—authorities at the Nebraska University arriving at a temperature of 108 degrees below zero!

The substance is chiefly interesting, however, because of its unusual properties. The experimenter can do a number of unusual stunts with a pound, which will cost him about 15 cents and which, with some conservation, will last half a day.

Frozen Mercury

Few of us have experienced the novelty of seeing frozen or solidified mercury in a thermometer. Mercury solidifies at about 40 degrees below zero. Yet you need only make a slight depression in a cake of dry ice, pour in a large drop of mercury and in 5 seconds, or 10 seconds at most, the liquid metal becomes solid and resembles solder!

Here is opportunity for the conjurer to exploit a new trick. He may freeze a bit of mercury out of sight on a piece of dry ice, hold it up to view, and with a few magic words, melt the metal in his hand. But the words must come fast for the metal will not long remain a solid in the human hand.

At any temperature above 108 degrees below zero, dry ice is continually turning to gas—which is the same as saying that gas is passing off constantly. And as a solid

STUNTS *with* DRY ICE

turns to gas, pressure is created. This feature of dry ice permits the use of a simple cannon that will appeal to the youngsters. Based on the same principle and acting similar to the old fashioned soda-vinegar-bottle arrangement, the use of dry ice is much more satisfactory. One test with cork and bottle showed that three small pieces placed therein would blow out the cork more than 35 times.

Dry Ice Cannon

You can quite easily build the cannon as illustrated in Fig. 1. The barrel is a short length of seamless steel conduit about ⅝-inch in diameter and 4 inches long. A block of 2 by 4 inch material was cut out with the band saw and a hole bored in the frame for the barrel. To seal the end of the tube, 6 hack saw cuts ½ inch deep were made and the pieces bent over on each other, then solder sweated over the end to render it gas tight.

If you wish, you can affix small wheels to the four corners of the cannon carriage. Get a cork that will snugly fit the end of the barrel, then drive in a small nail or needle, and sand off the front end of the cork to make it conical.

Loading the Barrel

To use the cannon, break up a number of small pieces of dry ice and drop them to the bottom of the barrel, then wet and insert the cork. The ice should not extend more than half way up the barrel or the cork will freeze in place. In a few moments the cork will be blown out with a good report and accompanied by a puff of the white gas which makes the discharge quite realistic. And if the cannon is aimed at a wooden or cloth target, the cork will stick in place.

A spectacular effect is created by setting a glass half full of water in front of a black background and throwing a spot light upon it. (See Fig. 2.) Then drop in a fair sized piece of dry ice. Instantly the water bubbles violently and the characteristic white gas fills the tumbler and falls to the table, much as would water. Carbon dioxide has a molecular weight of 44 as compared with 28.8, the molecular weight of air. It is this much greater density that caused the gas to tumble downward so rapidly.

Another conjurer's trick is to put a little water on a brick, block of wood or some other heavy substance, set an empty tumbler upon the wet spot, then drop some

Fig. 2. Weird effects are produced by directing light beam on "gassing" tumbler.

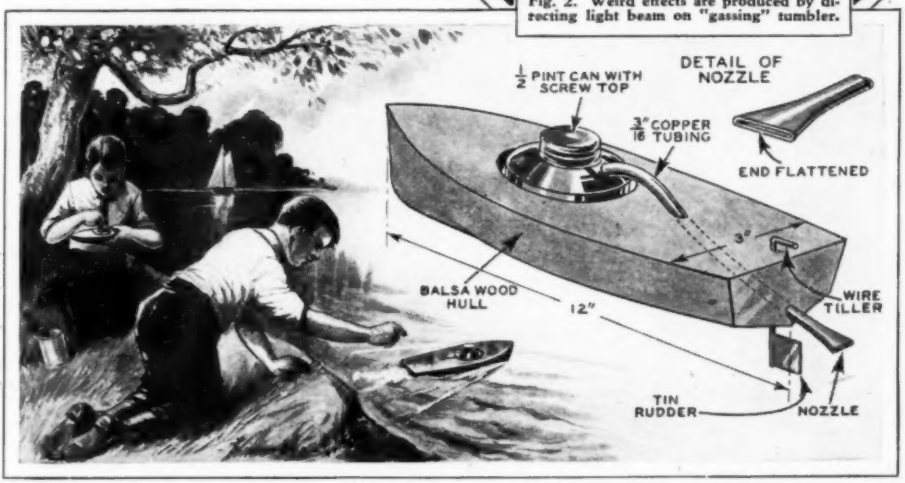


Fig. 3. With carbon dioxide gas for motive power, this little dry ice boat will develop a surprising speed. When ice is placed in can, the gas escaping through the nozzle will propel the boat forward. Flatten nozzle to extremely small outlet.

Fig. 4. Startle your friends with this mysterious trick. Place a little water on a board, set a glass over the water, and in the glass place a lump of dry ice. In a short while the glass will freeze to the board so that it can be lifted as demonstrated above.

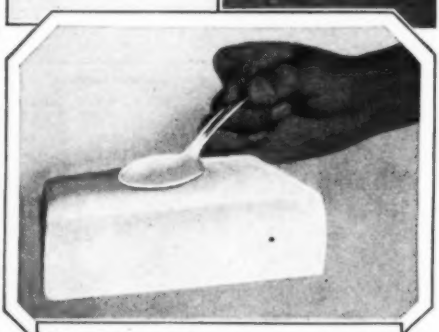


Fig. 5. Spoon on ice emits squeal like a pig.

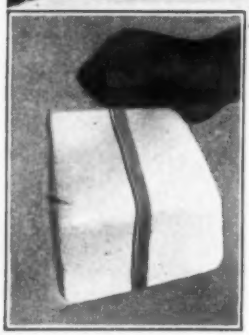


Fig. 6. A rubber band squirms and wiggles in most amazing contortions when given the dry ice treatment. First wrap the band around a cake of dry ice, as demonstrated in photo at the left, to freeze it stiff. When removed the rubber will twist about mysteriously in attempts to resume its normal form. In preparing for the trick, perform the preliminary freezing stunt out of sight of your audience.

dry ice in the glass. In a short time the two articles will freeze fast and the brick or block can be lifted by raising the glass. The trick is illustrated in Fig. 4.

You can make an ordinary rubber band do the unbelievable by placing it around or under a block of dry ice. After a few moments it is removed, and to the amazement of everyone, the rubber is rigid and nonflexible. See Fig. 6. Soon, however, it will begin to thaw out, and its gyrations and squirmings are interesting indeed, as it assumes its normal length and shape.

Press an ordinary spoon on a piece of dry ice, as demonstrated in Fig. 5, and it will sing like a canary or squeal like a stuck pig. What happens is this: The warm, smooth surface causes gas to be liberated quickly and it is this escaping gas that sets up vibrations in the spoon.

Dry Ice As a Boat Engine

Another interesting use of the power created by dry ice evaporation, is for propelling a small boat. The hull should be small and light. A block of balsa will be best, although white pine will also work well.

Make a hull, 3 inches beam and 12 inches long, as shown in Fig. 3. In the center, just back of the middle, hollow out a hole in which a half pint lacquer filler can may be seated. Bore a small hole from the deck top just back of this hole, to the stern just under the water line, then insert a 3/16 inch diameter copper tubing. Form a goose neck at the front end of the tube and solder this to a hole made in the can top as shown.

The stern tube end should protrude about 2 inches. Flatten this to a thin slit, but do not close entirely. Make sure that the can cover will seat air tight, then drop in a number of pieces of dry ice, just small enough to pass through the hole. This done, screw on the cap tightly and set the boat in the water.

Fuel Lasts Several Minutes

The gas shooting from the tube and acting against the water will send the boat forward and the action will continue for several minutes with one filling of "fuel." If the slit in the tube is too large, force it smaller, for a tiny jet of the compressed gas will drive the boat faster than a large jet under almost no pressure. You can add a simple rudder up front if you wish the boat to have this accessory.

It is suggested that you buy your dry ice from the nearest manufacturer. It can be shipped with but little shrinkage. Dry ice is very widely used as a refrigerant in ice cream trucks, and your local dealer will be able to supply you, or to inform you of the nearest source of supply.

Dry ice can be "made" by turning a cylinder of carbon dioxide upside down and opening the jet a little. Liquid runs out and a portion of it turns to snow which can be pounded into a wooden form which will cake it into dry ice.

Things to Make with Tools

Edited by A. NEELY HALL

Photocopier Makes Picture of Old Manuscripts

TIRED eyes, tired fingers, and a tired brain generally result from the weary job of copying pages from textbooks, plans, original manuscripts, or any data that is not practical to save for future reference, due to its excessive cost or rarity of its publication or origin.

There's a way around this difficulty, however, and that is by constructing this little photocopier, which will produce clear usable copies in the short time it takes you to snap a shutter and change a page.

The first step is to procure a camera. Any type will do. The box variety work as well in finished results as do the new sleek SIX-16 and SIX-20, recently put on the market by the Eastman Kodak Company.

The second task is to procure a lens through which to photograph the desired objects or pages. The common type of library hand reading lens will do, the ones with about three or four inch diameter being most suitable.

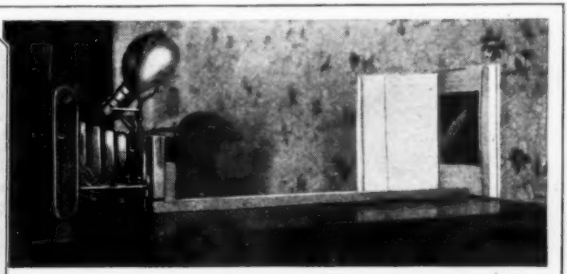
Now to find the focal length of your hand reader lens. Draw all the shades in your room except one. Tack a sheet of white paper on the opposite wall from the open window shade. Place a yard-stick against the paper and slide your hand reader lens along it causng a picture of outdoors to appear upside-down on the paper.

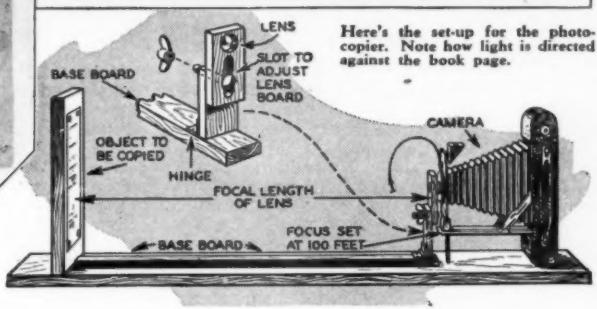
When this picture shows, plainly note the number of inches distant that your hand lens actually is from the white paper on the wall. That is the focal length and also the length you will have to cut your base board in building your copier. Any camera set to focus at 100 feet, or its infinity, will photograph a clear image through the lens, just measured, if the object photographed is set at the exact distance you have found on the yardstick.

The base board can be about four inches wide. You will need a lens board, hinged to one end of the base board. An ingenious way to construct the lens board is to make it in two sections as illustrated in the drawing below.

Almost any electric light bulb can be used as a light source when making your exposures of copy. For a fast lens such as the F-4, 5, a one second exposure serves very well. For the slower lenses, found in the general run of folding cameras, anywhere from three to five seconds exposure is required.

Above is seen a sample of the work done by the photocopier. Drawing at right shows how camera is mounted. Distance from object to camera equal to focal length of lens.





Here's the set-up for the photocopier. Note how light is directed against the book page.

Make Depression Profits by

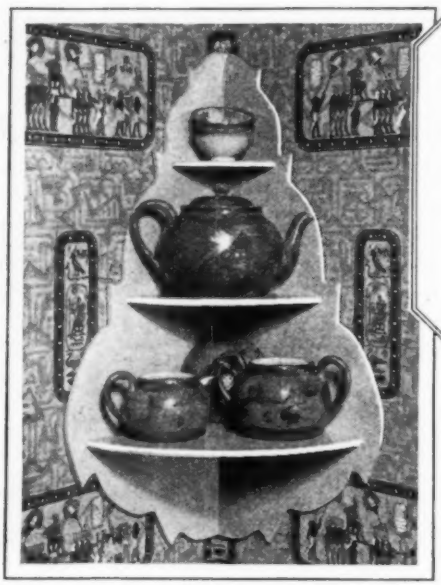


Fig. 1. A ready market will be found among housewives for these what-nots, which decorate corners with distinction.

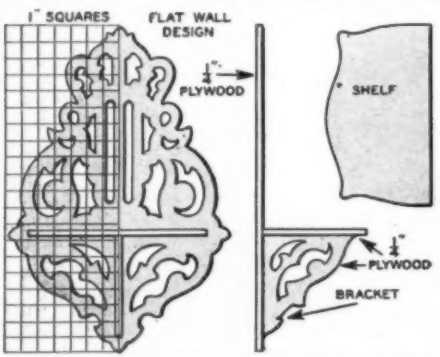
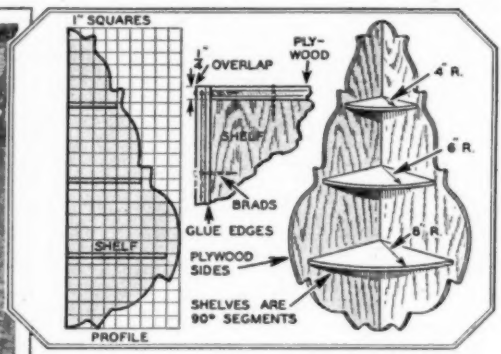


Fig. 2. If you have an order for a flat wall what-not, work it out with the design shown, which makes use of scroll saw.



Design for the sides of the what-not should be laid out on squared paper, then transferred to the ¼-in. plywood. Be sure to allow extra ¼ in. for overlap on one side.

Depression need hold no terrors for workbench fans, for with a few tools and some scrap lumber, handy household articles can be turned out that will find a ready market in any neighborhood. This timely article sets forth plans for five simple projects having high "sales appeal," and which will bring a maximum of profit with a minimum investment.

THESE are hard times, but there's no good reason why the current depression should get the best of a workbench fan who can wield his tools skillfully enough to turn out creditable pieces of furniture or knick-knacks having "sales appeal."

According to government reports workshops all over the country are humming with activity, producing salable articles that are disposed of by house to house canvassing or through regular dealers. In many cases, where plenty of space was available, small booths have been built by roadsides to display wares to passing motorists. Investments are small—all you need is a few pieces of lumber—and profits run as high as 200 to 500 per cent.

So why not put your craftsman's ingenuity to work and muscle in on the opportunities. Ideas for small attractive household articles abound on every hand, but in case you're at a loss try out your hammer and saw on some of the projects illustrated on these three pages.

"What-nots" Will Attract Housewives

Almost any housewife, once her eyes fall on one of the little "what-nots" shown above, ought to become a customer forthwith. Carefully made from graceful designs, they add a distinctive touch to a breakfast nook or dining room, and construction is extremely easy.

A simple but effective design is illustrated in Fig. 1. Material is one-fourth inch plywood cut to the profile given in the squared layout. This is an easy job with a coping or scroll-saw after the design has been transferred to the wood with carbon paper. In the case of a corner what-not, however, note that the left half must have one-fourth inch extra material to allow for the overlap at the corner joint.

Brads and glue are used to hold the half together. Each shelf is a 90 degree segment

Selling Workbench Products

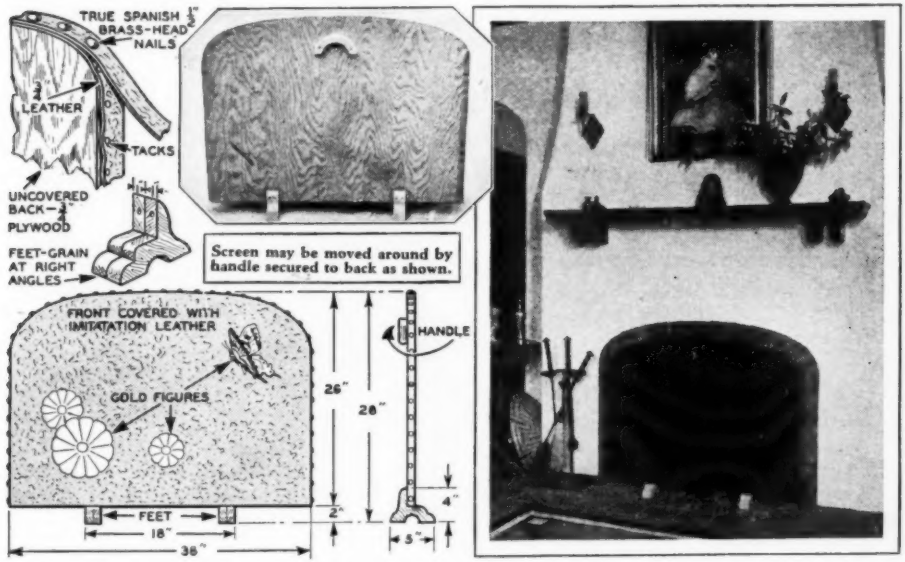


Fig. 3. A gaping fireplace hole detracts from a room's beauty in summer time, so you will find ready market for these screens. To give your product distinction, work out ornamental designs on leather or imitation leather covering plywood.

of a circle cut on the radii indicated, and installed with brads and glue. The original in the photograph is finished in a canary yellow, but of course choice of color depends upon its surroundings for harmony.

The flat wall design shown in Fig. 2 demands more elaborate scroll-saw work, but is uncommonly attractive in this old-fashioned motif. It is also made of one-fourth inch plywood, with shelf and bracket made as shown in the drawing. This type lends itself to an oil stain to bring out the grain of the wood.

Fireplace Screens Salable in Summer

If any of your friends have homes with fireplaces, you might approach them with a proposition to build a novel screen for the fireplace to conceal the gaping hole in the summertime, when a fire would be decidedly inappropriate. If the idea goes over, then set to work on the ornamental screen shown in Fig. 3.

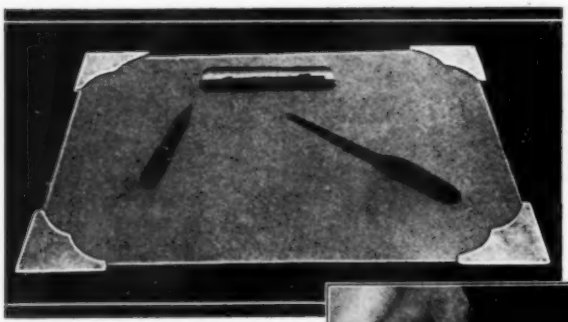
This screen involves only the simplest of carpentry. A piece of ¾ in. plywood is first cut to the contour of the fireplace opening, but half-an-inch larger all around. It is then faced with imitation leather—or the real article if you care to go to that expense.

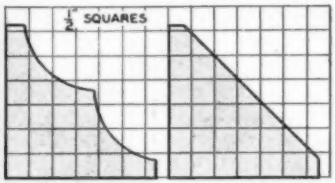
The feet and the hand-grip on the back are next installed. Note, in the drawing, that the feet are made up of two one-inch halves cut so that the grain will be at right angles when glued together. This is insurance against splitting.

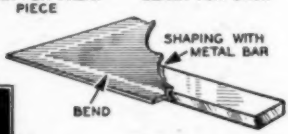
Fig. 4. Last word in novelty is represented in this bridge lamp, made from one-inch chain with links brazed together with acetylene torch. Insert shows how legs are formed.

Bind the edge with a strip of leather secured with round-head brass nails, about ½ in. in diameter. The design on the face of the screen is, of course, a matter of individual taste. In the drawing is shown an adaptation of the Imperial Japanese

Decorative Corner Blotters Can Be Sold to Business Men and Stationers







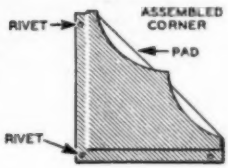


Fig. 5. The nuisance of curling corners of desk blotting pad is eliminated once and for all when these lead gadgets are set in place as illustrated in the photo above. Drawings at extreme right show how the designs are laid out from squared paper. The top piece has its edges bent with a hammer as shown in center drawing. When completed, the top and bottom pieces are fastened together with escutcheon tacks. Photo at right shows how the corners are set in place.

chrysanthemum seal. Do not attempt too elaborate a color scheme in your decoration. One or two tones, contrasting with the dull leather background, will be most effective.

Who would believe that a chain could make a bridge lamp that would take all honors for uniqueness. Such a lamp will arouse curiosity in all who pause to inspect it, and this pause will be your signal to begin a sales argument.

Fig. 6. Shade of this unique combination lamp and clock revolves and indicates time with pointer. Note how clock is mounted on top of the base, which must be of dimensions to take rear of clock. The hour hand revolves shade.

The lamp shown in Fig. 4 was fashioned from an ordinary one inch chain, each link being brazed to the adjoining link at the desired angle. This job will prove surprisingly easy, for all you have to do is lay the chain out straight and bring an acetylene torch into action.

Making Bridge Lamp From Chain

A pattern will be necessary for the legs and top pieces, however. This is made from a piece of channel iron, bent to the required form. When the chain is laid on the iron, the vertical links drop into the channel, while the horizontal links are held uniformly across the top. Then it becomes just another job of brazing.

There should be about 12 links in each leg, with a bottom link fastened crosswise to provide ample bearing surface on the floor. The top piece holding the lamp is made from the same pattern, but three extra links are used to turn up the back for artistic effect.

To fasten the light socket and its swivel attachment, build up solid about half of the end link, then bore a hole to receive the bolt, which is tightened with a wing nut. Weld the wing nut onto the end of the bolt, too, to make adjustment easy. With the metal work finished, now bring the shellac brush onto the scene and coat the whole thing so as to prevent oxidation. Wire up in the standard manner, weaving the standard silk lampcord through the links of the chain.

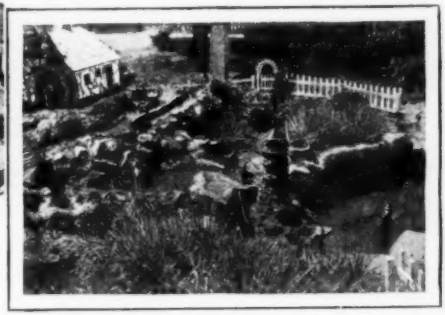
Next on the list of workshop projects having high sales appeal is the set of ornamental blotter corners made of lead, as illustrated in Fig. 5. They will prove particularly attractive to business men, who

(Continued on page 154)

Swiss Chalet makes Unique Yard Ornament

From this photo you can see how unique and picturesque a back yard ornament the chalet and grounds make.

Motor which operates mill wheel and drives oxen along road is housed in mill as shown above. Mr. Nielson, builder of the chalet, is shown adjusting the mechanism of the displays.



One attractive feature of chalet grounds is tiny lighthouse set within the pool and having electric lamp in the turret.

WANT to give your back yard distinction and make it the envy of all your neighbors? Then follow the example set by Mr. O. E. Nielson, an office worker of Omaha, Nebraska, who has developed an idea in yard ornamentation that has attracted the attention of gardeners throughout the town.

The attraction is an elaborate miniature Swiss chalet. Suitable for duplication by any clever home workshop fan, the chalet covers an area of 20 feet by 20 feet, and includes the following features: A mill with running water turning the wheel, the miller's home, a small waterfall, a lighthouse with an electric light in the turret, a rustic bridge spanning a rivulet, and a pretty picket fence enclosing the entire area.

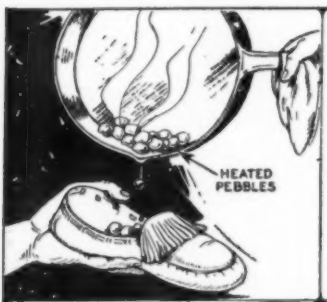
The photos above will give you an idea as to how you may build a similar chalet in your own back yard. Not shown, however, is the quarter horse motor housed in the mill and operating the water wheel and other devices.

The little village also boasts many features which puzzle visitors. A realistic-looking frog basking on lily pad in the pool spouts water from its mouth, while a short distance away a team of oxen hitched to a tiny wagon plod along a mountain trail, ostensibly hauling grist to the mill. The mill houses the mechanism, water pipe connections, valves and switches which control the spectacular display.

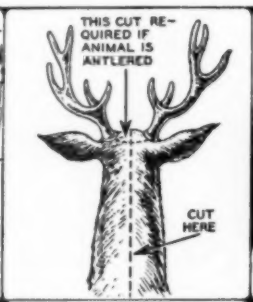
At night the little village takes on a striking splendor, illuminated as it is with various colors from a spotlight mounted on the corner of the house. If you wish to duplicate the chalet you'll find plenty of opportunities to exercise your ingenuity.

Stone benches, sun dials, flower stand form other decorations to be seen around Mr. Nielson's yard. Rocks for all these decorations are taken from fields near by at a small expense.

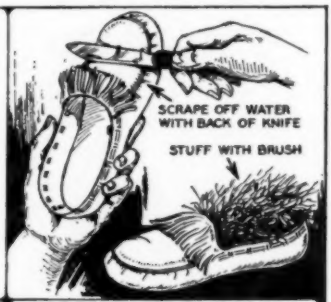
HANDIKINKS for DEER HUNTERS



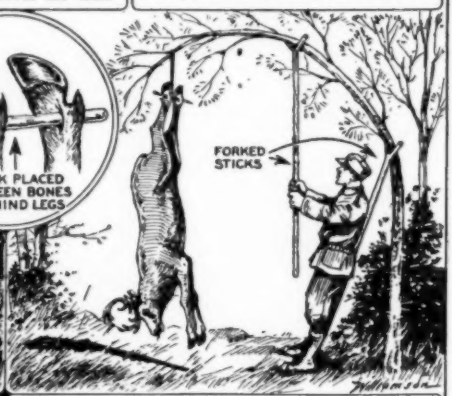
To dry wet moccasins in a hurry, heat clean pebbles in the frying pan, pour into the moccasins, and shake around. This dries them and makes them warm.



Only two cuts are necessary to remove skin of deer whose head you wish to mount. Scrape flesh from the skin.

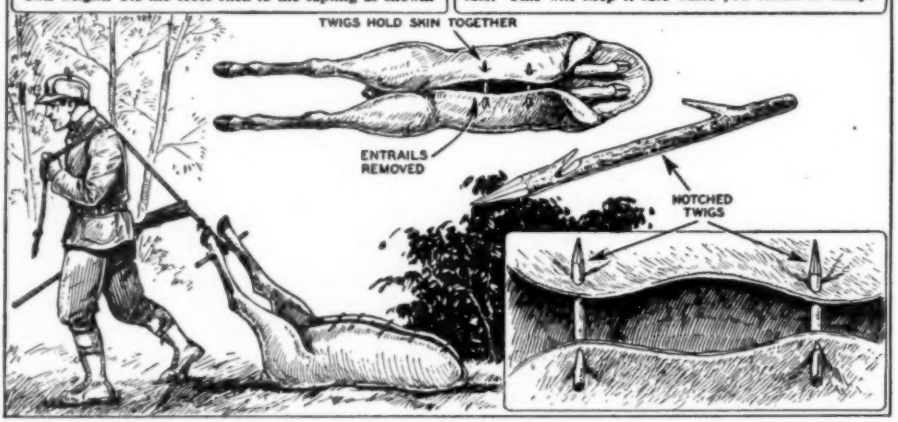


Another way to speed the drying of moccasins (they should never be dried quickly over a fire) is to scrape off water, stuff with brush, and hang up.



If a deer is too large to pack back to camp alone, place a strong stick between the bones of the hind legs. Climb a nearby sapling and bend it toward the deer by your own weight. Tie the cross stick to the sapling as shown.

Cut two forked sticks. Press one against the sapling and press against it as you push up with the other. When deer is raised as high as possible, place one stick under carcass. This will keep it safe while you return to camp.



If only the meat of the deer is desired and you are not interested in preserving the head and skin, dragging the animal to camp can be simplified. Cut off head and neck, leaving a flap of skin on back of neck. Slit carcass down the middle and remove entrails. Cut off the forequarters and place in opening. The skin may now be drawn together and held with twigs notched as shown. By placing stout sticks between the bones in the hind legs, the carcass can easily be dragged.

Finish Your ATTIC—Bring in Dollars

Two views of the finished attic room, plenty large enough for two beds. Note the closets installed in two corners.

Walls and ceiling are of building board—either Insulite or similar material, composition wood or gypsum board.

IN THESE depression days when so many people are looking for ways of making extra money, there is one sure-fire source of revenue which is very generally overlooked. Almost every home has an attic which is usually used for nothing but a storehouse. By refinishing your attic into a comfortable room, at a cost of from $50 to $150, you can rent it out to a roomer for a nice monthly income. In addition, you have considerably increased the value of your home. And if you are a handy man with a few simple tools you can go out and contract for this sort of work and make excellent full or part time money.

Buy at Rock-Bottom Prices

There is no difficulty in the attic finishing job. Get two or more lumber dealers to look over the place and give you a flat price on all the materials needed. Competition will assure you of rock bottom prices. You will need a few lengths of 2x4 for studding, flooring, wall board material such as Insulite, composition wood or gypsum board for the paneling, and white pine bats for the trim.

Accompanying this article are photos showing the appearance of a typical attic during different stages of its transformation. It is a typical space, too, being 24 feet long and 12 feet wide. First of all, sheathing was laid across the first floor ceiling joists. Then the wall studding was cut and spaced to catch the edges of the composition material used. With a small motor-driven bench saw mounted on a wide board as shown, even the cut-and-try method of construction proceeds rapidly.

Drawers Built in Wall

A nest of 3 wide drawers to set flush with the wall was made and installed in its framework in the corner opposite the stair well. These drawers slide back into unused space under the low roof. Then the paneling was done and mop boards with quarter-round for finish installed.

Previous to all of this, of course, the necessary wiring was done to give two drops from the ceiling, and one wall outlet between the beds. Provision was also made to get heat into this room from the basement furnace by extending a sheet iron shaft through a first floor partition to the attic floor. The inlet was directly over the top of the furnace.

Laying the oak floors was the step requiring the most time. But with the motor and saw handy, this went forward rapidly. Battening the panel joints with white pine strips was also a cut-and-try job, and took perhaps 2 hours. These were later stained walnut and the walls and ceiling, after being sized, were painted a flat ivory. Mop boards, quarter round strips and the nest of drawers and trim were stained to match the strips.

Before varnishing the floor, the area was sanded and filled. Two coats of varnish sufficed. The two pictures of the furniture in place give but a faint idea of the lovely result. The stair well was guarded with a railing and a closet was installed in one corner at each end of the room.

"SEA SKEETER" is Ideal

THIS unique craft is designed for the young skipper who has had no previous experience in marine construction, and who wants an inexpensive, light boat in which to learn the A-B-C's of navigation.

By using a single sheet of galvanized iron for the entire bottom the job of caulking is practically eliminated, for the joint between bottom and side-members is made water-tight when assembled by means of a strip of cloth soaked in white lead. Also, the builder need not worry over a centerboard-well because the centerboard is hinged to the bottom and no opening is required.

The mast together with sail and boom can be lifted out of the step instantly and stowed, the only rigging being a single main sheet. Steering is with a paddle which comes in handy during a calm.

General dimensions are given in an accompanying drawing. Note that the boat has ample beam and freeboard, and a generous spread of canvas. White pine is suggested for all wood parts except mast, boom and centerboard, because of its relative strength and buoyancy in the water in case of swamping or capsizing. It is assumed, of course, that any sailor will learn to swim before he attempts to sail the deep.

Cut the side pieces to the shape shown in Fig. 2, of ¾ in. white pine. Assemble the cross pieces at ends and bottom so that they are flush with the edges of the side members. Now nail temporary diagonal braces across the gunwales and turn the frame upside down. Lay a double strip of muslin or ¾ in. binding tape along the edges of the side pieces and hold in place with small tacks about every 15 inches.

Give the cloth a good soaking of white lead and then put on the galvanized sheet iron. This can be purchased in 28 gauge, 30 in. wide and 8 ft. long, for about $1.50, and the entire piece will weigh under 16 lbs. Begin nailing it amidships, with galvanized nails about the size of shingle nails, and work toward the ends. Stagger the nails about ¾ inch apart. See that

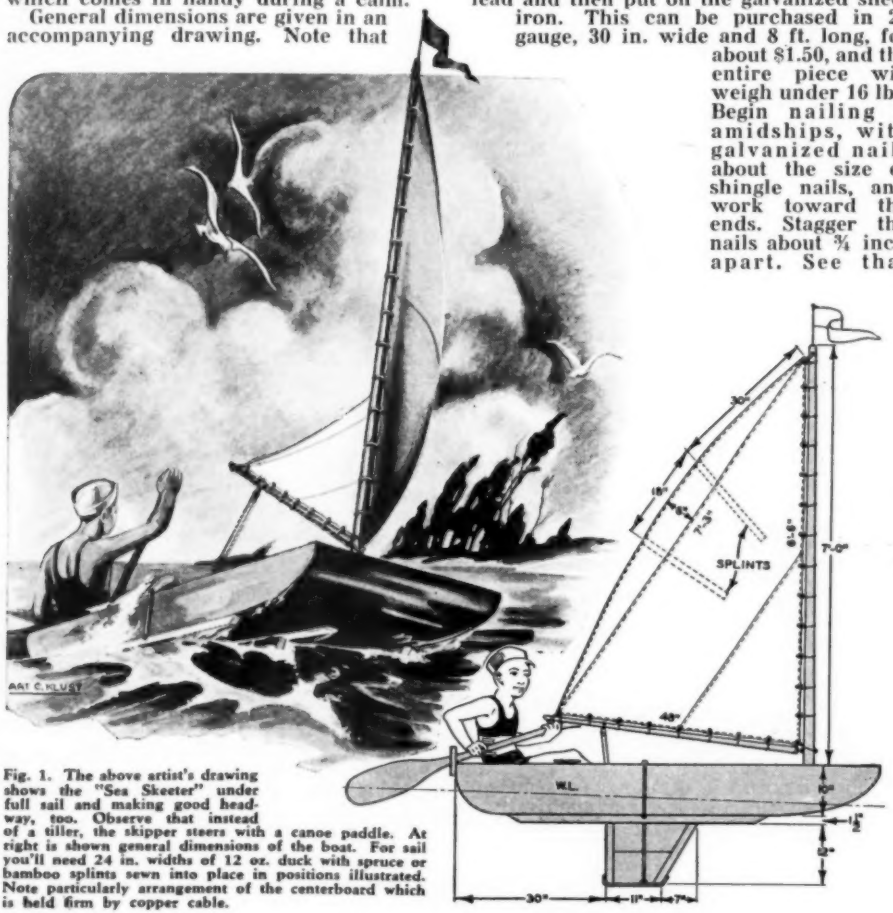


Fig. 1. The above artist's drawing shows the "Sea Skeeter" under full sail and making good headway, too. Observe that instead of a tiller, the skipper steers with a canoe paddle. At right is shown general dimensions of the boat. For sail you'll need 24 in. widths of 12 oz. duck with spruce or bamboo splints sewn into place in positions illustrated. Note particularly arrangement of the centerboard which is held firm by copper cable.

BOAT for Young Mariners

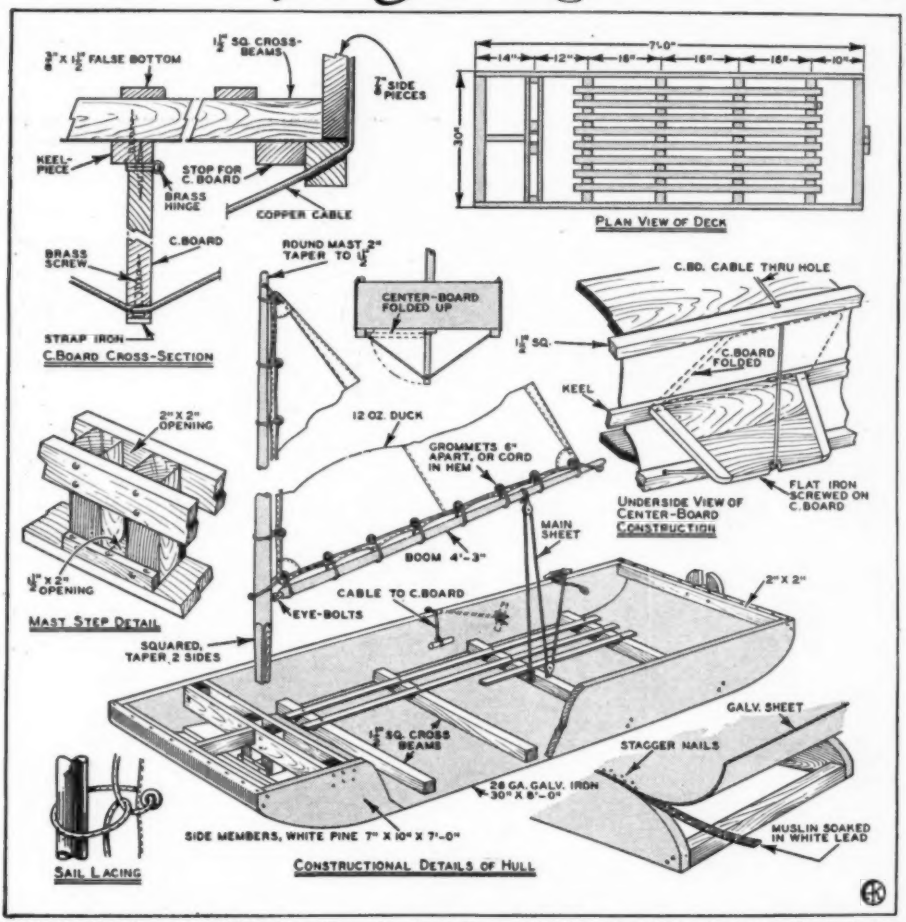


Fig. 2. Detailed dimensions of "Sea Skeeter" are given here. Bottom of hull is formed from 28-gauge galvanized sheet iron, 30 in. wide and 8 ft. long, fastened with shingle nails to side members. Center board is hinged to keel piece, so that it can be folded up for beaching. Boom is secured to mast with eye bolts. Note oarlock on stern for steering.

every head is driven down well.

When the nailing is completed hammer the edges of the galvanized sheet into the wood so that it will not catch on anything and work loose. Do not drive any nails through the metal bottom into the cross members, but the keel piece which holds the centerboard will need to be screwed to the cross members, as shown in Fig. 2.

This sectional drawing also illustrates arrangement of centerboard and woven copper cables which brace it for the open position.

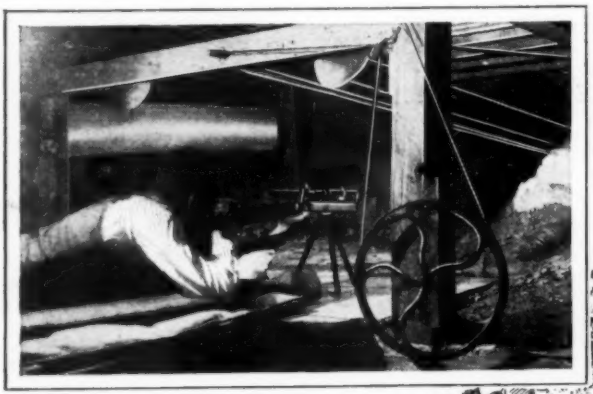
Note that the cables pass through holes drilled in the skids attached to the sides of the bottom. Fig. 3 shows how the centerboard folds up under the boat when it is to be beached. The centerboard, 12 in. deep by 18 in. tapering to 11 in. at the bottom, is built up of ¾ in. hardwood. (See Fig. 1.)

Two 6-in. boards are cut to shape and tied together at the ends with cleats of the same thickness. A notch is made in the center of the bottom so that the head of the brass lag screw carrying the copper cable will not extend beyond the bottom of the centerboard. A flat iron or brass strip is also installed.

The centerboard is pulled into the open position by the starboard or right-hand cable, while the port or left-hand serves as a brace, the latter being used also to draw it back into the folded position.

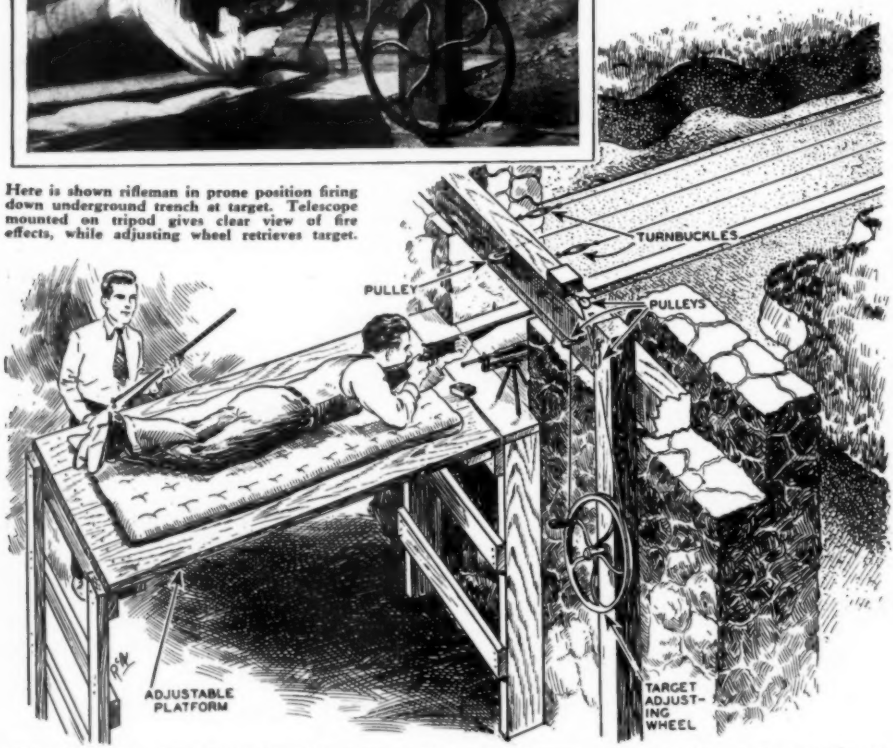
(Continued on page 152)

Build a 75 Foot TARGET



A lot of wide open space isn't necessary for the construction of a target range. By following plans given here you can build a 75-ft. range in your own basement for practice shooting.

Here is shown rifleman in prone position firing down underground trench at target. Telescope mounted on tripod gives clear view of fire effects, while adjusting wheel retrieves target.



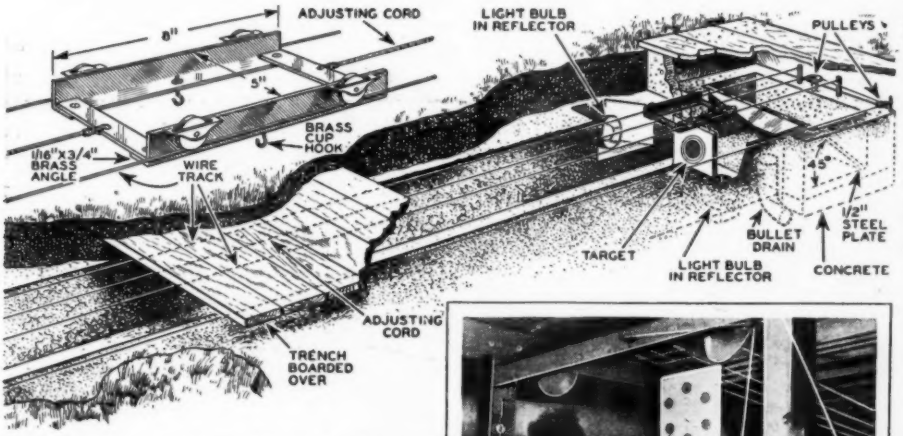
Adjustable platform is raised for firing from prone position and is lowered against wall for standing position. Note arrangement of the pulleys through which adjusting cord passes. Keep wire track taut with the turnbuckles at ends.

RIFLE enthusiasts who keep regular business hours may find it inconvenient to enjoy anything approaching regular shooting practice. Some may belong to various clubs which hold night sessions at indoor ranges, while a few possessing extensive grounds may have their own private target ranges, but the average sportsman with small bore rifle equipment and a strong desire to shoot is not likely to have such facilities available to him.

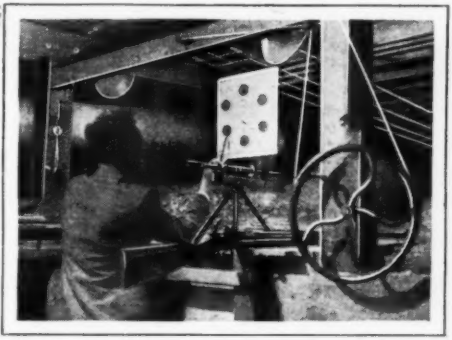
The plan here set forth deals with the construction of a 75-foot target range for the home, which means a house situated on a city lot. The original idea of this plan has the shooting pit in the basement with the target pit set at the far end of a tunnel or trench. And while this description concerns the latter idea, the construction may be set outside the house, either above or below the surface of the ground. The mechanics of the range will be the same in any case.

Assuming that the target range is to be adapted for the basement, the construction must necessarily begin with excavating. A

RANGE in Your Basement



Drawing above illustrates layout of target pit and construction of target carrier. Lights set in the sides of concrete trench illuminate targets. Bullets are deflected down into drain with ½" steel plate set at 45 degree angle. Trench, extending outside basement, is boarded over as shown.



Scoring the shots on target which has been hauled back to shooting pit with the adjusting wheel. Regulation 25-yard targets are attached by thumb tacks to 12"x14" frames.

trench 75 feet long—plus 1½ feet, the length of the target pit—and approximately 2 feet deep and wide must be dug.

The greater length of this trench will, in all probability, be on the *outside* of the house, so excavation may be started more conveniently from the outside. Obviously, the foundation must be cut through. However, a rifleman with foresight may, when building a home, have this excavating done when the foundation is laid and thus save much time and effort.

Excavation Easy Job

It may seem at first thought almost a prohibitive job to excavate below the house, but in most cases the ground floor of a house is from two to four feet above the level of the ground, so it may be accomplished without extreme difficulty. Moreover, it must be remembered that there will be but a fraction of the trench which cannot be dug from above.

The shooting pit is not dug, but is located conveniently in the basement itself. It is not likely that the floor of the basement will be of the correct height and in such a case will have to be raised or lowered to suit the conformity of a man in erect firing position. The floor of the shooting pit should be solid, preferably of concrete or tile.

Constructing the Target Pit

The target pit is from one-half to a foot deeper than the trench but need be no wider. While the trench is boarded over and sodded, the target pit should have a movable top in order that it may be readily accessible.

A steel plate at least one-half an inch thick is set in the pit at a 45-degree angle in such a way that it will reflect flying lead downward. The pit is best lined with concrete or tile with a suitable drain beneath it, especially if the range is being constructed in a part of the country where rains are frequent.

The feature of this indoor shooting range is its convenience, and the remainder of this description may be adapted to almost any sort of range. The placing and retrieving of the target is accomplished entirely from the shooting pit.

Steel Wires Makes Target Carrier Tracks

Two steel wires—No. 12 or 14—seven inches apart are stretched near the roof of the trench from the target pit to the shooting pit, being tightened by turn buckles. On these wires rides a carriage constructed of 1/16 in. by ¾ in. brass angles eight inches long and five inches wide. These brass angles are riveted together to form a rectangle which hangs from four ball-bearing sheaves that groove over the taut wires.

Midway and below the carriage on cup hooks hangs the wooden target frame, 12 in. by 14 in., suitable to hold regulation 25-yard targets attached by thumb tacks.

(Continued on page 152)

Photos Printed on Kerchief by New Process

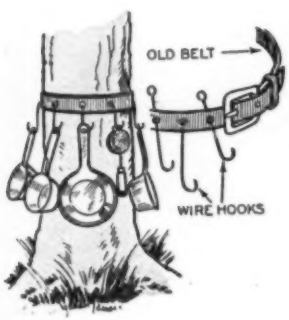
IMMERSE HANDKERCHIEF IN SOLUTION OF POTASSIUM FERRICYANIDE AND FERRIC AMMONIUM CITRATE
HANG UP HANDKERCHIEF IN DARK ROOM TO DRY
PRINTED BY SUNLIGHT FOR ½ HOUR
DEVELOP IN COLD WATER FOR 10 TO 15 MINUTES

Attractive appearance of photos printed on handkerchief is shown by above photo. The simple printing process is explained step by step in the drawings shown at the right.

YOUR favorite photo negative can be printed in blue upon a handkerchief, by a simple process developed experimentally by chemistry students at Venice, California, High School. Using a friend's portrait as a pattern lends a personal touch that makes the novelty a valued gift. This interesting experiment required only two inexpensive chemicals, potassium ferricyanide and ferric ammonium citrate.

Dissolve four ounces of each of the two chemicals named in four fluid ounces of water, forming two solutions which may be preserved indefinitely, if kept separate and stored in dark bottles. To use, combine equal parts of the solutions in such quantity as may be needed, forming a sensitizing solution, pale apple-green in color. Immerse the entire handkerchief, then wring it out and hang it up in the darkroom to dry.

To print, place the negative upon the sensitized handkerchief and cover the rest of the cloth with a cardboard mask so that light cannot enter except through the negative. Place it in the sun and cover it with a piece of glass. If the handkerchief is doubled, cardboard must be placed under the first fold, else the image will print through on the cloth below. About half an hour's exposure to bright sunlight is required, after which the handkerchief is developed by washing in cold water for ten or fifteen minutes.—Sterling Gleason.



Tree Belt Makes Handy Holder for Utensils

ONE of the most annoying inconveniences of camping out is the lack of accommodations for taking care of the various pieces of equipment. As far as kitchen utensils are concerned, the absence of drawer space can be efficiently overcome by use of the simple means shown in the drawing at the left.

Take an old leather belt and punch holes through it at its center, spaced about three inches apart. If a regular leather punch is not available, a nail will do the job satisfactorily. Through these holes insert pieces of wire about five inches in length. Bend the lower end into the form of a hook, with a loop at the opposite end to keep it from pulling through the hole. Strap the belt around a tree and hang your dishes from the hooks.

SPARKS from the RADIO EDITOR

Edited by L. B. ROBBINS

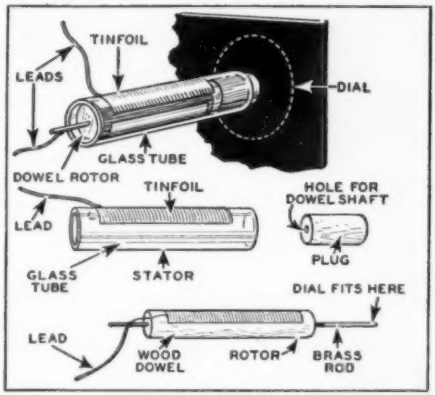
Efficient Condenser for Emergency Use

COMPOSED simply of a piece of wooden dowel, a glass tube, and some tinfoil, this little vernier condenser will be found immensely useful where an instrument of very small capacity is required.

The condenser is made by first fashioning a hardwood plug that will make a tight fit in a hole in the panel, as shown in the accompanying drawing. Fit this plug in the panel, then cut off about two inches of glass tubing, into which the plug will fit, and secure it later in this position with glue or Duco cement.

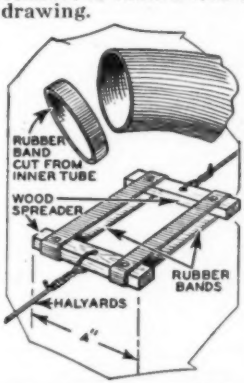
Next, cut off a piece of wood dowel 1½ in. long and sandpaper it down so it will make a slightly loose fit inside the tubing. Then drive a stiff brass rod through the center of the dowel's length, allowing about 1½ in. to project out the end.

Now cut two strips of tinfoil, both one inch long, and one wide enough to fit half way around the dowel and the other half way around the glass. Glue or shellac the strips in their respective positions, then connect to them a lead as illustrated in the drawing.



Condenser is mounted on panel as illustrated here.

Push the tube over the dowel and force it home on the plug. A knob can then be fastened to the rod and the wires connected in the circuit.



Strips From Inner Tube Make Flexible Insulator

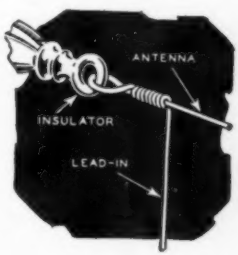
MANY times the amateur is hard put to it to find an insulator for a temporary antenna. Here is an insulator that will serve the purpose well and it has the added advantage of being somewhat flexible.

Cut two hardwood sticks about 4 inches long and ¾ of an inch square and, if possible, boil them in paraffin. Drill a small hole in the center of each one. Then get a section of fresh, live inner tube that has seen its usefulness in the automobile world, and cut out two one-inch sections to form wide rubber bands. Tack them to the sticks as shown in the sketch. Fasten the antenna to one stick and the halyard to the other and hoist the antenna in position.

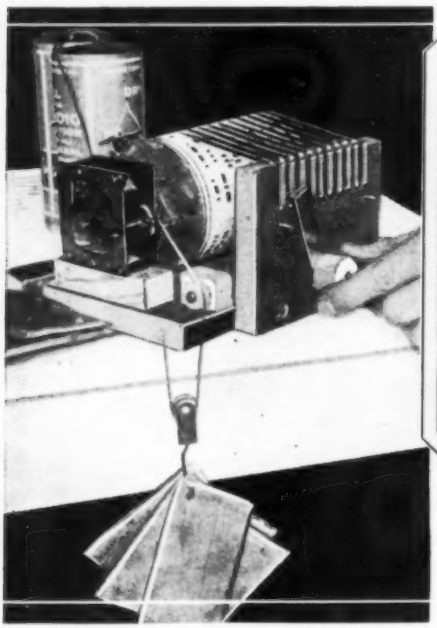
Slight swaying of a tree holding the antenna or heavy gales will not tend to put the shock on the wire or rope as if a solid insulator was used.

Here's Proper Way to Take Lead-in Off Antenna

WHEN erecting an antenna never make the mistake of hanging up the antenna and lead-in in two pieces; your aerial should be one continuous wire from the open end right down to the lightning switch. Just how the lead-in should be taken off the antenna, or "skywire", is shown in the accompanying drawing. Run the end of the wire through the eye of the insulator, then give the lead-in a few twists and you will have a firm anchorage. With this arrangement there is no danger of loose contacts or corrosion, and consequently no annoying clicking in your receiver. About No. 14 bare copper wire will make a good antenna.



Learn RADIO CODE on



The completed omnigraph, ready for code lessons. Weights suspended on hook turn the drum around which the code sheet is wrapped. The switch arm permits shifting from one set of characters to another in rapid order, preventing anticipation of letters.

In practice lay parts out on table as illustrated above.

Radio amateurs having difficulty in learning the radio code in preparation to going on the air with a transmitter will find this home-made omnigraph a helpful and patient instructor. It reels off the dots and dashes at any desired speed to develop your proficiency at reception.

A SIMPLE device to use for learning the radio code can be easily made with a tin can, an old alarm clock works and a few pieces of tin and wood. The omnigraph has been so designed that it is reliable in its operation, but requires no special tools or parts for its construction.

The principal features of the instrument can be seen in the accompanying drawings. The clock works rotate a tin can which is connected to the minute hand shaft. A simple universal joint is used to couple the clock and can.

In preparing the clock works for use on the omnigraph the escapement mechanism must be removed and also the main spring. A small wooden spool is then mounted on the main spring shaft. The clock works is operated by a cord wound around this spool and force applied by means of a weight.

The tin can drum is covered with a paper held in place by rubber bands, as illustrated in Fig. 1. The dots and dashes are cut in this paper and a contact spring makes contact through the holes in the paper as the can is rotated, thus completing an electrical circuit and making the radio signals.

Operating on the Clock Works

The hair spring and adjacent parts should be removed from the clock works, but the escapement wheel left in place. The wheels will then spin rapidly, depending on the force applied to the main spring shaft. If desired, the alarm spring and wheels and hour hand wheels may be also removed.

The main spring is removed because there is no simple way to regulate the speed if it is used. By substituting a small pulley spool in place of the main spring and driving it with a cord and weight, the speed can be regulated by the weight applied.

This method also gives a longer run per winding than

How to Become a Radio Amateur

When you've learned the radio code from this omnigraph you're ready to take your government license and get on the air with your transmitter. How to achieve the status of full-fledged amateur and how to build your own long distance transmitter and receiver are told in the booklet, "How to Become a Radio Amateur," available for 25c from Modern Mechanix Radio Editor, 529 South Seventh Street, Minneapolis, Minnesota.

Home-built OMNIGRAPH

with the spring. The time is doubled by adding the movable pulley, as shown in the drawing, and doubling the weight. The cord is wound up by turning the winding key in the usual manner. The can should rotate about once in 4 to 8 seconds.

A universal joint between the clock works and the tin can drum is desirable because with the simple mounting used it is difficult to align the shaft and bearing properly. Contact with the tin can drum is made through the end bearing. This is not a perfect way to complete the electrical circuit, but it is entirely satisfactory.

Rotating Drum From Tin Can

The contact springs make very good contact with the tin can because of the bright tin plated surface. When selecting a can, choose one without dents and with a bright surface. Soak the paper label off. Cut a circular piece of tin and solder into the open end. The tension of the contact springs should be such that they will move downward about ⅛ in. if the drum is removed.

To make a paper with code lessons, first cut an oblong strip of paper the width of the can and about ¼ in. longer than the circumference. (See Fig. 2.) Cross-line or graph paper is best if available. Place the paper on the drum and mark where the contact springs touch it. Cut the holes in the paper with a small chisel or sharp knife.

How to Mark Dots and Dashes

The holes should be about ⅛ in. wide. Make a dot 1/20 to 1/16 in. long. (Some cross section paper is made with lines 1/20 in. apart.) Make a dash 3 times as long as a dot, the space between signals (dots and dashes) equal to 1 dot, the space between letters 4 dots, the space between words 8 dots.

Since most letters indicate some other letter when reversed, the paper can be

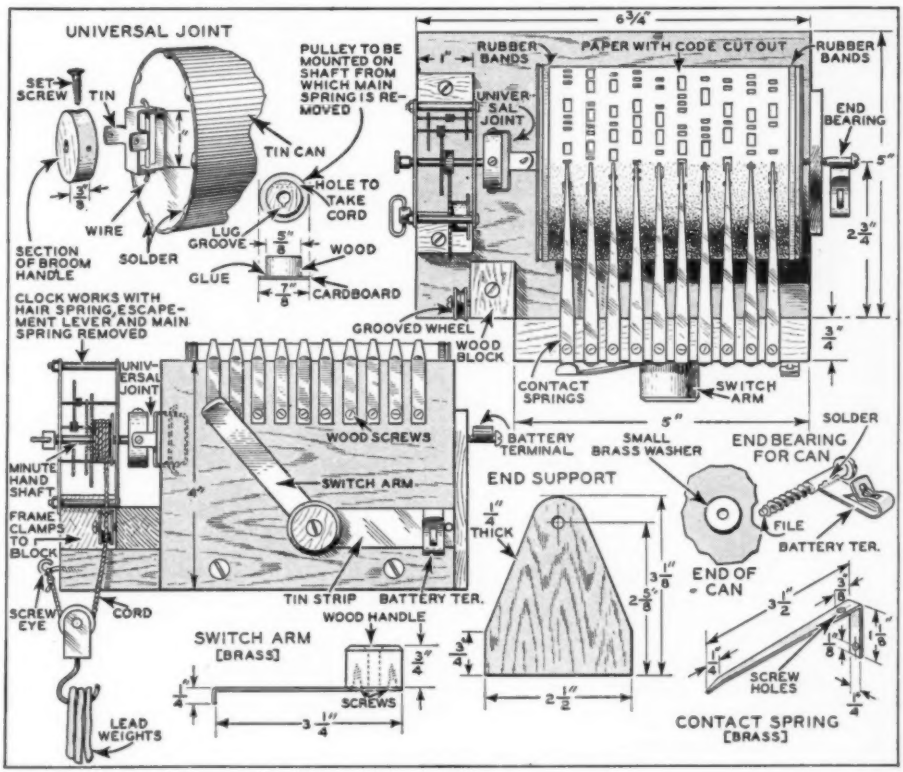


Fig. 1. Details of construction are given here. Universal joint coupling permits best alignment of drum and quick removal. Note how frame of clock clamps to block. Connections to battery are taken off from end bearing and switch arm terminal.

Dots and Dashes Cut in Graph Paper to Form Characters for Practice

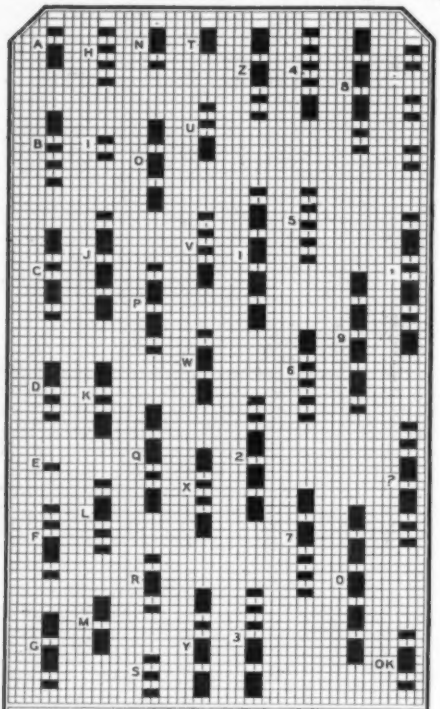
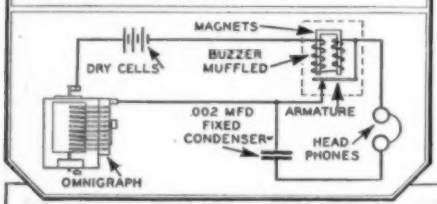


Fig. 2. Here is how dots and dashes of characters are cut out of squared paper.



placed on backwards and a new group of signals obtained.

The circuit, shown in Fig. 3, is as simple as could be desired. Taps are taken off the end bearing and switch arm of the omnigraph, the former leading to the battery and the latter going to the armature contact of the buzzer and the fixed condenser.

Wiring of Omnigraph Is Easy

Either a loud speaker or a pair of head phones may be used, whichever you have available. In wiring them into the circuit, hook one terminal to the wire which connects the armature to the magnet, and the other terminal to the remaining terminal of the fixed condenser.

Sparking on the springs which make contact with the rotating drum can be prevented by hooking small fixed condensers (about .1 mfd.) across the bearing contact and switch arm lead.

As mentioned before, the speed of the sending depends upon the weight of the lead pieces suspended on the hook. For beginners, about four pounds is required on the hook for transmission at a fairly slow speed.

When practicing, allow the dial to turn around and around till you have learned the letters in that row thoroughly, then switch to the next row. If after long practice you get to know the letters well, shift the switch arm without looking where it is placed and try to take the signals down without a break.

Practice for Advanced Students

When you have learned to identify the characters with a moderate degree of speed, try making a few new code sheets, with the letters well mixed, rather than in alphabetical order. With such a scheme you cannot anticipate the letters, and so practice will be much more beneficial.

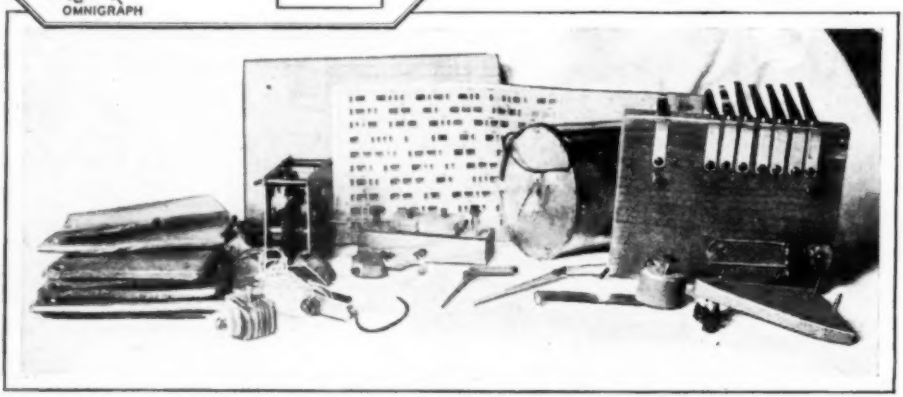
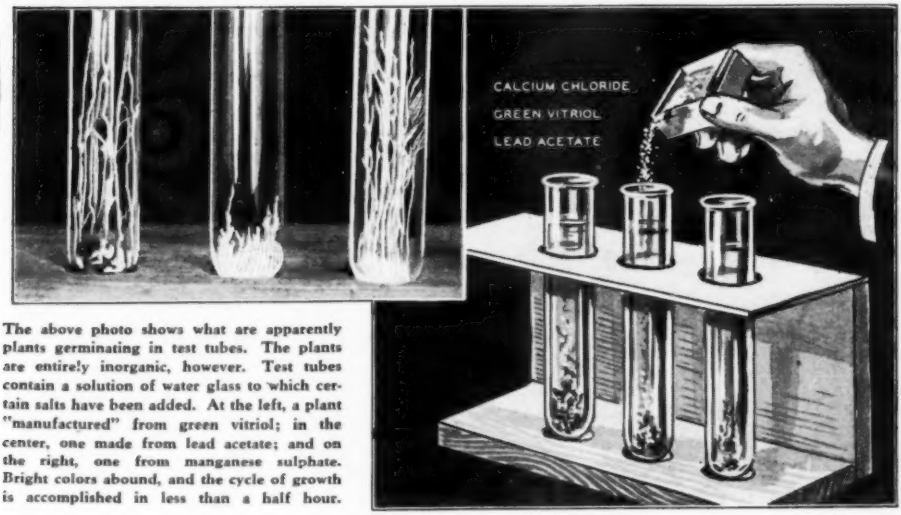


Fig. 3. Wire up omnigraph and accessory parts according to the circuit at top left. Note that one side of phones taps onto wire of buzzer that connects armature with the magnets. All necessary parts required are seen in bottom photo.

Growing Artificial PLANTS by Chemistry



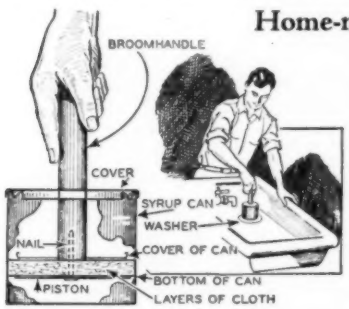
The above photo shows what are apparently plants germinating in test tubes. The plants are entirely inorganic, however. Test tubes contain a solution of water glass to which certain salts have been added. At the left, a plant "manufactured" from green vitriol; in the center, one made from lead acetate; and on the right, one from manganese sulphate. Bright colors abound, and the cycle of growth is accomplished in less than a half hour.

YOU can grow plants in half an hour with a few simple chemicals—the only catch is the fact that though they look attractive to the eye, they can't be eaten.

First you will require a small quantity of water glass solution. This is procurable in any drug store and at many groceries, being in common use as an egg preservative. Thin this down with about six times the volume of water, stir the solution well and pour it into test tubes.

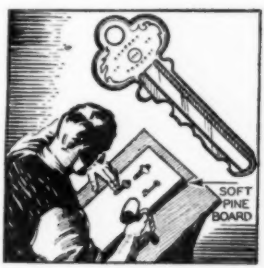
Take a few grains of calcium chloride and drop into one of the tubes. Do likewise with copper vitriol, green vitriol, lead acetate, manganese sulphate, and any other salts you care to experiment with. You'll find that strangely beautiful "plants" will form within half an hour, taking every imaginable shape and presenting all the varied colors in the rainbow.

Home-made Force Pump Clears Clogged Plumbing



WHEN the drain from the kitchen sink becomes clogged the trap may often be cleared by use of the home-made force pump shown at the left. It is made by removing the bottom of a large syrup can and fitting it with a piston plunger made from the top and bottom of the can, with several layers of cloth placed between them and nailed to the end of a handle. A cup of washing soda dissolved in a quart of hot water and poured down the sluggish drain will help loosen the hardened grease if permitted to stand for half an hour. Hold the pump over the drain. Run two inches of hot water in the sink to seal the lower edge, and pump vigorously.—Edwin R. Gildner.

Impressions in Board Replace Keys When Lost



WHEN a key is lost and there is no duplicate, the operation of replacing it is an expensive one, involving fitting directly to the lock itself. It is a simple matter to preserve impressions of keys so that they will be available in an emergency, enabling duplicates to be made from them easily. Secure a soft pine board with a smooth surface and place your key flat upon it. By tapping the key with a flat surfaced hammer, a permanent impression is left in the board. Of course impressions must be taken of both sides of the key. When a record is to be kept of more than one key it is advisable to write a code number underneath. The board should be filed where strangers cannot get hold of it.—Geo. A. Smith.

Model Missouri Side Wheeler

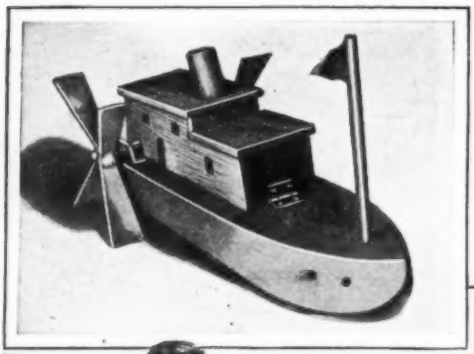
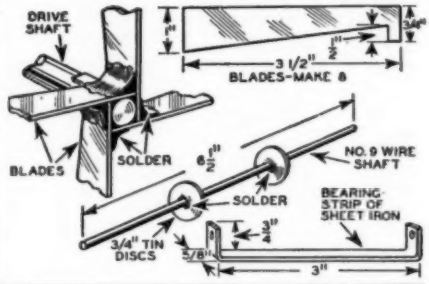


Fig. 1. Here is the completed boat, ready for launching. Note the trim lines of cabin and hull.



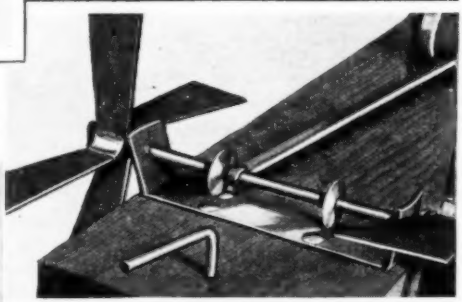
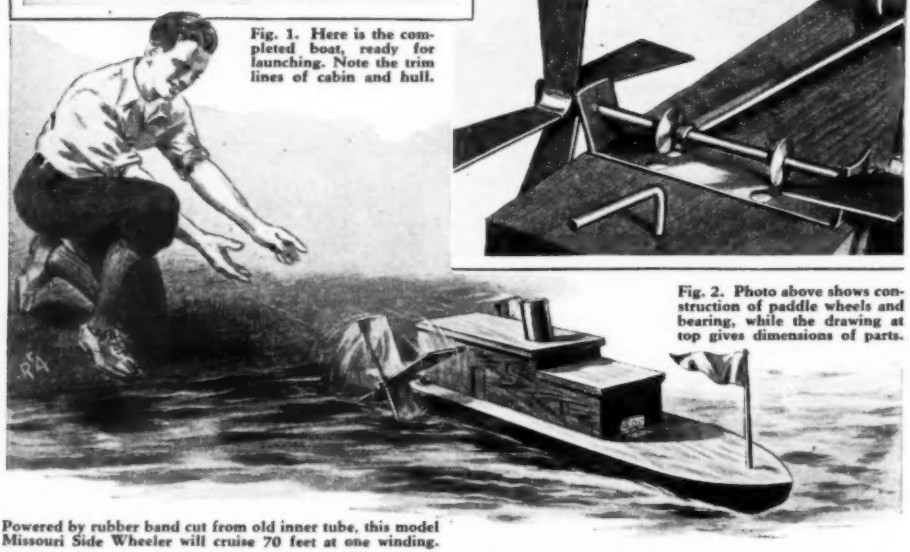


Fig. 2. Photo above shows construction of paddle wheels and bearing, while the drawing at top gives dimensions of parts.



Powered by rubber band cut from old inner tube, this model Missouri Side Wheeler will cruise 70 feet at one winding.

THIS trim little boat has more than a passing resemblance to the historic side wheelers which used to steam up and down the Missouri River.

Briefly, the boat comprises a hull, a cabin, and a power plant of the dimensions given in the drawing on the opposite page (Fig. 4).

The wheel blades are 3½ inches long, 1 inch wide at the tip and are cut as shown in Fig. 2. Each of these are soldered to the end of the No. 9 wire shaft. First one blade is soldered in place, then the next, and so on all the way around. See that the space inside the square thus formed is well filled with solder, and tin the ends of the wire well by heating, rubbing with solder, then rubbing quickly with a rag, before the soldering is commenced.

The bearing strip, shown in Fig. 2, is a piece of heavy galvanized sheet iron ⅝-in. wide with holes for the No. 9 wire punched 3/16-inch from the top of each upturned end. Bearing and shaft should fit loosely. After soldering the four blades to one end of the shaft, assemble the shaft through the bearing strip, placing three small washers between wheel and bearing.

Packed with hard oil, these washers will keep the bearing lubricated for a long time. After the bearing assembly, solder the four wheel blades to the other side. The outside edges of each wheel should be in line, with the flare all on the inside.

When the hull has been shaped, the rudder, consisting of a length of No. 9 wire and piece of sheet iron soldered together as illustrated in Fig. 4, can be put in position. Bore a hole to make a snug

Has Long Cruising Radius

fit down through the boat stern 1 inch from the end and run the wire through this.

Now mount the bearing and wheels in position on the hull, carefully centering the unit and fastening it down with screws or nails driven through the four holes made for them.

In building the cabin the windows and doors are not cut, but are painted in afterward. However, a slot should be cut each side of the cabin where necessary to clear the shaft. After building the sides, ends and roof, the front is hinged to the deck as shown in Fig. 4.

Three small nails are driven into the lower edge of each of the cabin sides so that ½ inch of the ends protrude. The heads are then cut off and their position marked on the deck by pushing down. Holes are drilled at these points a little oversize. Thus the hinge holds the cabin in position while the nails when sunk into the holes prevent any side play.

The spool and sheet iron support, assembled as shown in Fig. 4, are mounted as near the front as possible, inside the cabin, so that no moving portion touches the sides to cause friction.

The keel is cut from sheet lead to the shape shown. The top edge is cut to a serrated edge with the tin snips and the triangular portions bent first to the right, then to the left, alternately. The keel should be mounted to the underside of the hull in such a position that it will trim the ship—that is, cause the finished boat to float in the water with the deck top level.

The method of winding is simple. One boy pulls out the band by grasping the screweye until the rubber is quite taut. Another boy holds the boat and turns the paddle wheels. As the rubber is wound up, the free end is fed in until finally all the surplus is used up.

Fig. 3. To facilitate replacement of worn out rubber bands, hinge the cabin to deck, as illustrated in photo.

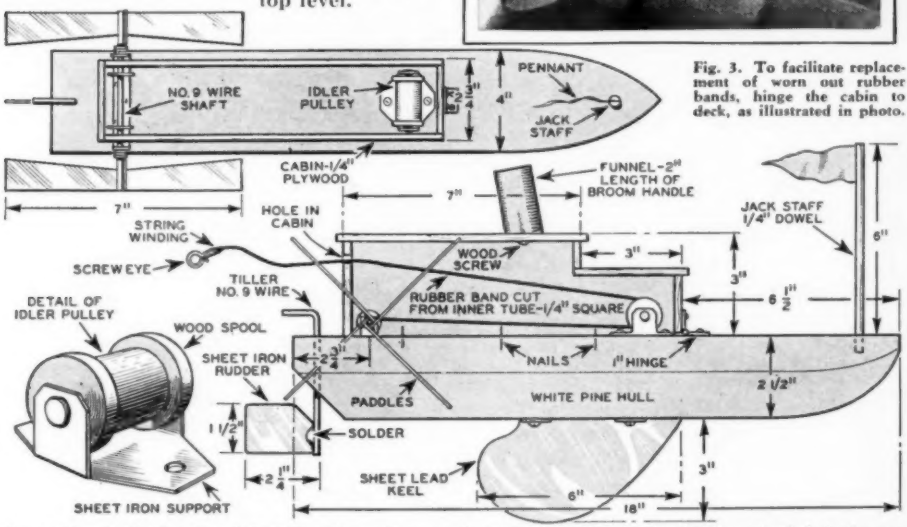


Fig. 4. Note in this drawing of the hull, cabin, and power plant, how the rubber band is fed through a hole in the rear of the cabin. Idler pulley should work loosely on shaft. See that lead keel has proper balance and weight to trim ship.

Wing Construction of M-M

With the compressed air motor and fuselage completed for the M-M model plane, you're now ready to build the wings, which are of all-wood construction, but amazingly light and sturdy.

by DICK COLE

UNDOUBTEDLY many MODERN MECHANIX AND INVENTIONS readers who studied the first part of this article, which was published in the September issue of M-M, will now be possessed of the compressed air motor and tank fuselage. In case you missed out on the first installment of the article, you can procure a copy of the September issue for 25 cents from MODERN MECHANIX AND INVENTIONS, 529 So. 7th St., Minneapolis, Minn.

Of course, the compressed air powerplant is not confined to any particular design of model plane any more than a Wright Whirlwind motor must be used only on a plane of specific design.

Because of the proportionately greater power available from the compressed air motor than from the commonly used rubber band motors, departure can be taken from the usual construction employed in making flying model planes. Rather than pushing a flimsy inclined plane through the air, depending solely on the under surface of the wings for lift, thick wing construction, with its far greater lifting power, can be applied.

Plane Is Good Lesson in Aerostatics

The compressed air motor is capable of swinging a husky prop to overcome the greater drag in the thick wing design.

In this article I shall describe the construction of a wing and stabilizer assembly, which, with the compressed air motor, will give a very satisfactory flight demonstration. These assemblies are designed so that

Here is the compressed air motor-powered plane on the flying field ready for the take-off. Wire undercarriage cuts resistance to minimum. Photo at top shows the plane in flight, having just taken off from the top of a high hill.

Compressed Air Motor Plane

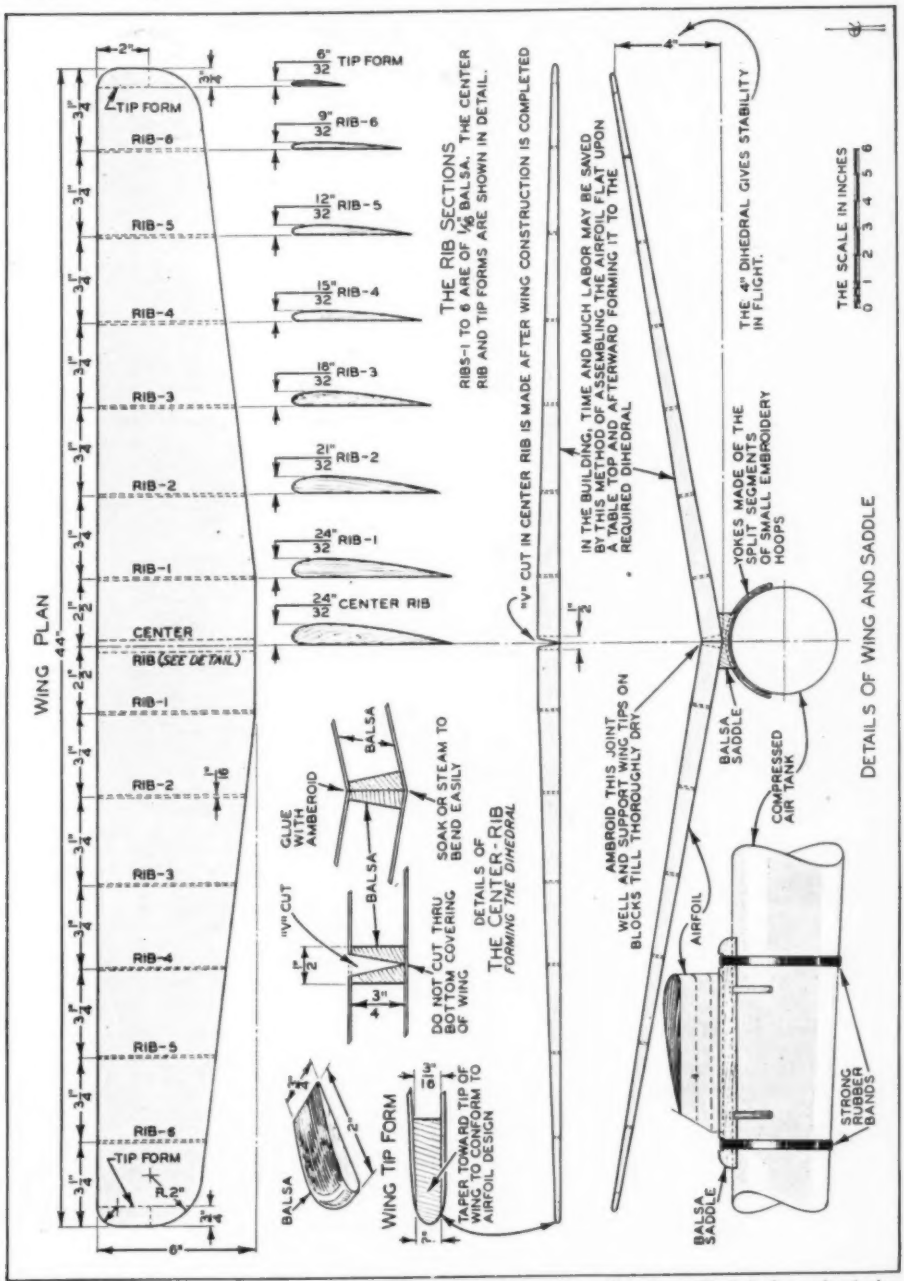
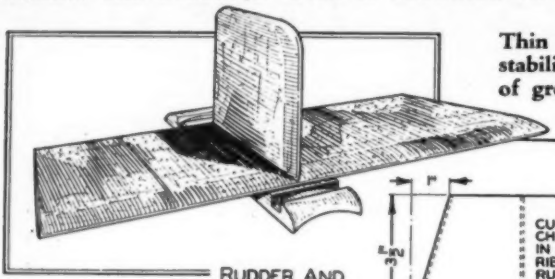

WING PLAN
44"
TIP FORM
RIB-6
RIB-5
RIB-4
RIB-3
RIB-2
RIB-1
CENTER RIB (SEE DETAIL)
RIB-1
RIB-2
RIB-3
RIB-4
RIB-5
RIB-6
TIP FORM
R.2"
6"
6" TIP FORM
9" RIB-6
12" RIB-5
15" RIB-4
18" RIB-3
21" RIB-2
24" RIB-1
24" CENTER RIB
THE RIB SECTIONS
RIBS-1 TO 6 ARE OF 1/16 BALSA. THE CENTER RIB AND TIP FORMS ARE SHOWN IN DETAIL.
"V" CUT IN CENTER RIB IS MADE AFTER WING CONSTRUCTION IS COMPLETED
IN THE BUILDING, TIME AND MUCH LABOR MAY BE SAVED BY THIS METHOD OF ASSEMBLING THE AIRFOIL FLAT UPON A TABLE TOP AND AFTERWARD FORMING IT TO THE REQUIRED DIHEDRAL
THE 4" DIHEDRAL GIVES STABILITY IN FLIGHT.
THE SCALE IN INCHES
0 1 2 3 4 5 6
YOKES MADE OF THE SPLIT SEGMENTS OF SMALL EMBROIDERY HOOPS
BALSA SADDLE
COMPRESSED AIR TANK
AIRFOIL
STRONG RUBBER BANDS
BALSA SADDLE
AMBROID THIS JOINT AND SUPPORT WING TIPS ON BLOCKS TILL THOROUGHLY DRY
DETAILS OF WING AND SADDLE
BALSA
GLUE WITH AMBEROID
SOAK OR STEAM TO BEND EASILY
"V" CUT
DO NOT CUT THRU BOTTOM COVERING OF WING
DETAILS OF THE CENTER-RIB FORMING THE DIHEDRAL
BALSA
WING TIP FORM
TAPER TOWARD TIP OF WING TO CONFORM TO AIRFOIL DESIGN

Fig. 1. Cut ribs to shape shown here and glue in position at designated stations. Note large dihedral of completed wing.

Rudder and Stabilizer Unit Is Mounted on Fuselage With Balsa Saddle



Thin balsa wood "skin" on wings, stabilizer, rudder gives combination of great strength and light weight.

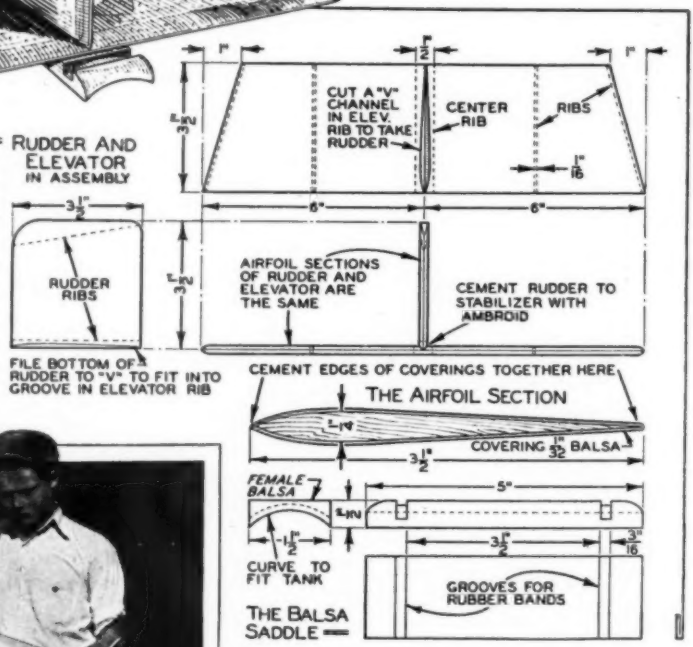

RUDDER AND ELEVATOR IN ASSEMBLY
CUT A "V" CHANNEL IN ELEV. RIB TO TAKE RUDDER
CENTER RIB
RIBS
RUDDER RIBS
AIRFOIL SECTIONS OF RUDDER AND ELEVATOR ARE THE SAME
CEMENT RUDDER TO STABILIZER WITH AMBROID
FILE BOTTOM OF RUDDER TO "V" TO FIT INTO GROOVE IN ELEVATOR RIB
CEMENT EDGES OF COVERINGS TOGETHER HERE
THE AIRFOIL SECTION
COVERING BALSA
FEMALE BALSA
CURVE TO FIT TANK
GROOVES FOR RUBBER BANDS
THE BALSA SADDLE

Fig. 2. Rudder and elevator are formed to shape shown here. Ribs are covered with 1/32 in. thick sheet of balsa wood in same manner as wings. Center rib of the stabilizer has groove to take V-cut on bottom of the rudder. Completed rudder and stabilizer unit are glued to balsa saddle, which is mounted on the after section of tank fuselage with rubber bands. Note grooves in saddle to take the bands.

All completed parts, ready for assembly, are seen in this photo. Note yokes on the wing saddle with which wing is mounted on the fuselage. Extremely sturdy construction of parts permits plane to be subjected to heavy punishment.

they can be readily detached and others substituted, so the experimenter can try out a variety of wing and stabilizer combinations, and thereby learn much of the laws of aerostatics.

It is well that the prospective builder of this model should first look over the accompanying photographs and drawings and glean a fair insight into the general construction of the model. In a meager but fundamental way, in its wing construction, it follows the design of the Ford All Metal Monoplanes.

The manner of building the wing offers a radical departure from the usual method employed in building flying models. Rather than using flimsy balsa wood spars and rice paper, the wing is of all-wood construction.

At first thought, this may suggest excessive weight. But not so! This wing has no main spar. Instead, rigidity and strength is had by forming the leading edge of bent balsa wood. The resultant wing is far stronger, weight for weight, than the usual wing.

Furthermore, the wing is not distorted in flight and its airfoils remain fixed. Greater efficiency and better control result.

Shaping the Wings

Fig. 3 shows how this wing is formed. First, a solid form is made over which the leading edge is shaped. For a form, a piece of pine, or any other wood, $\frac{3}{8}$"x3"x48" is planed down on one of its flat surfaces to the shape shown in the end elevation.

Next, a piece of balsa wood $\frac{1}{16}$"x4"x44" is sanded down to about $\frac{1}{32}$". To do this well, lay the balsa wood on a perfectly flat surface, as glass, and rub it with a flat surfaced block to which has been glued a sizeable piece of medium sandpaper.

Use a selected, straight-grained piece of

Wing Has No Main Spar—Leading Edge of Balsa Gives Ample Rigidity

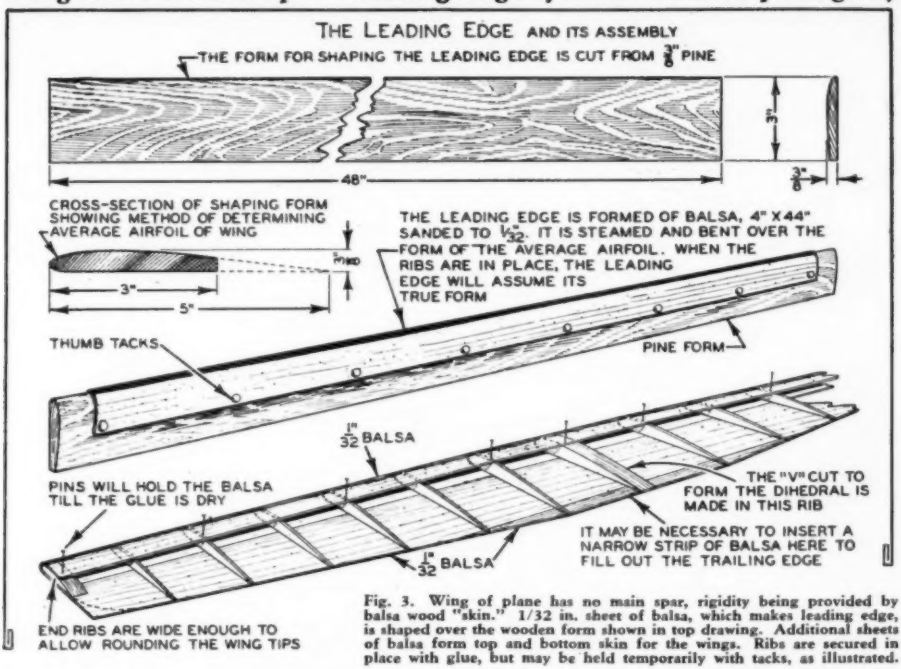

THE LEADING EDGE AND ITS ASSEMBLY
THE FORM FOR SHAPING THE LEADING EDGE IS CUT FROM 3/8" PINE
3½"
48"
3/8"
CROSS-SECTION OF SHAPING FORM SHOWING METHOD OF DETERMINING AVERAGE AIRFOIL OF WING
1/32 RED
3"
5"
THE LEADING EDGE IS FORMED OF BALSA, 4" X 44" SANDED TO 1/32". IT IS STEAMED AND BENT OVER THE FORM OF THE AVERAGE AIRFOIL. WHEN THE RIBS ARE IN PLACE, THE LEADING EDGE WILL ASSUME ITS TRUE FORM
THUMB TACKS
PINE FORM
1" 32 BALSA
PINS WILL HOLD THE BALSA TILL THE GLUE IS DRY
THE "V" CUT TO FORM THE DIHEDRAL IS MADE IN THIS RIB
IT MAY BE NECESSARY TO INSERT A NARROW STRIP OF BALSA HERE TO FILL OUT THE TRAILING EDGE
1" 32 BALSA
END RIBS ARE WIDE ENOUGH TO ALLOW ROUNDING THE WING TIPS

Fig. 3. Wing of plane has no main spar, rigidity being provided by balsa wood "skin." 1/32 in. sheet of balsa, which makes leading edge, is shaped over the wooden form shown in top drawing. Additional sheets of balsa form top and bottom skin for the wings. Ribs are secured in place with glue, but may be held temporarily with tacks, as illustrated.

balsa wood for this purpose, preferably of the "male" variety. In lumber-yards, balsa wood is designated "male" and "female." "Male" balsa wood is much more dense and heavier than the "female." The "female" variety is exceptionally soft and lightweight, but breaks across the grain very easily.

After the strip has been sanded down to about 1/32", it is placed in hot water for fifteen to twenty minutes. The family bathtub will serve as a wetting trough. The strip can then be folded easily around the leading edge of the form as shown in Fig. 3.

A few thumb-tacks will hold it in shape until dry. If set in the sunlight, it will dry thoroughly in several hours. The formed section is then ready to be used for the leading edge of the wing as shown.

Getting the Ribs in Place

However, before the wing can be built up, the ribs must be made, so let us refer to Fig. 1, which gives the plan and elevations of the wing, along with approximate airfoil of all the ribs except the middle and the two end ribs.

Except for the middle and end ribs, all are cut from 1/16" balsa wood (male). The middle rib is 1/2" wide while the end ones are 3/4". The purpose of these dimensions will be explained later.

With the ribs formed, let us go back to Fig. 3. Before inserting the ribs, we must prepare the strips of balsa which will form the top and bottom surface of the wing.

Female balsa wood can be used here. "Stock" balsa wood usually cannot be had wider than 4", so we will build up the wing on that assumption. Two strips 1/16"x4"x44" are sanded down the same as when preparing the leading edge.

One of these serves as the under surface of the wing, and is joined evenly to the under edge of the leading edge strip. The middle rib is first inserted and cemented with ambroid. Then the end ribs are put in place. The ribs can be held temporarily with pins until the cement sets. The location of the other ribs is laid out and they are set in place.

Wings Taper Towards End

In originally shaping the leading edge strip on the form, no provision was made for tapering toward the ends. But, as the ribs are inserted in place, the wing will take on a natural taper. It may seem unusual to have a wing laterally straight on the bottom side and taper toward the ends on the top. However, later a dihedral is put in the wings, so the unusual taper of the wings is of no account.

After all the ribs are in place and the ambroid has set, the balsa wood strip for the top is put on with cement. If only 4" wood has been used, the trailing edge at the middle will have to be filled in with narrow strips.

After the wing is completely built up, the

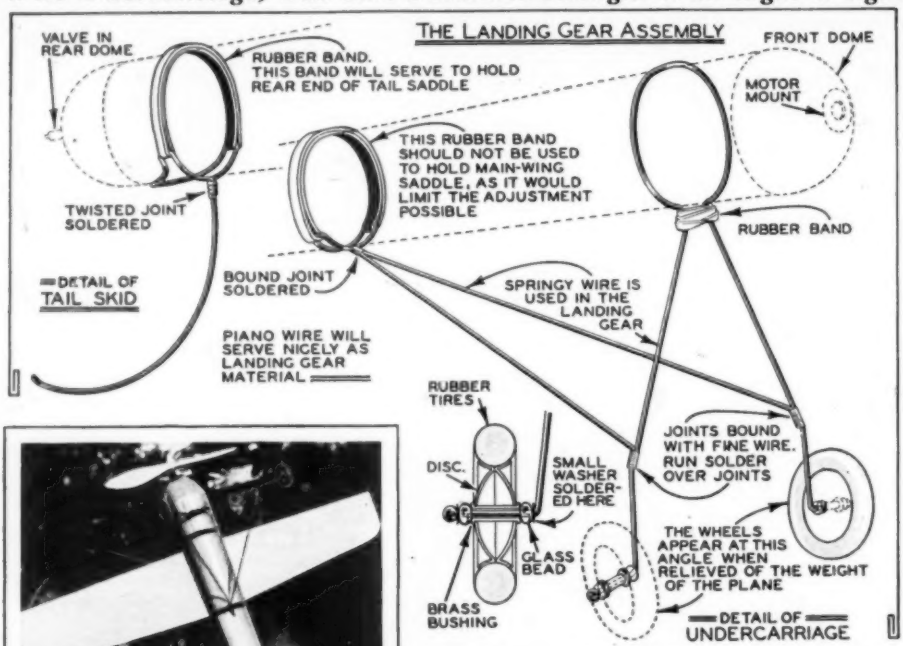

THE LANDING GEAR ASSEMBLY
VALVE IN REAR DOME
RUBBER BAND. THIS BAND WILL SERVE TO HOLD REAR END OF TAIL SADDLE
FRONT DOME
MOTOR MOUNT
THIS RUBBER BAND SHOULD NOT BE USED TO HOLD MAIN-WING SADDLE, AS IT WOULD LIMIT THE ADJUSTMENT POSSIBLE
TWISTED JOINT SOLDERED
RUBBER BAND
DETAIL OF TAIL SKID
BOUND JOINT SOLDERED
SPRINGY WIRE IS USED IN THE LANDING GEAR
PIANO WIRE WILL SERVE NICELY AS LANDING GEAR MATERIAL
RUBBER TIRES
JOINTS BOUND WITH FINE WIRE. RUN SOLDER OVER JOINTS
DISC.
SMALL WASHER SOLDERED HERE
GLASS BEAD
THE WHEELS APPEAR AT THIS ANGLE WHEN RELIEVED OF THE WEIGHT OF THE PLANE
BRASS BUSHING
DETAIL OF UNDERCARRIAGE

Fig. 4. Undercarriage and tail skid are formed from springy steel wire to cut weight and wind resistance to minimum. Thin aluminum disks of wheels are shaped over a hardwood block and held together with thin aluminum bush having flared ends. Make tires from para rubber tubing.

dihedral is formed as shown in Fig. 1. A "V" is sawed in the middle of the wing, cutting right through the wide, middle rib. But care must be taken not to cut through the balsa wood that forms the under surface of the wing. The wood is moistened at this point and bent. The "V" is cut to provide for a 4" dihedral. The "V" slot is coated heavily with ambroid and the wing tips blocked up.

Attaching Wings to Fuselage

The manner of attaching the wing to the tank fuselage is illustrated in Fig. 5. The wing is cemented permanently into a balsa wood (female) saddle. Rubber bands fit into grooves in the ends of the saddle and pass completely around the fuselage.

The saddle is further reinforced with semi-circular yokes made from sections of small wooden embroidery hoops. These can be had at any "Five and Ten" store. The sections are cemented into grooves in the under side of the saddle. This method of attaching will hold the wing very fixedly to the fuselage, but will permit its removal in a few seconds' time.

This wing has remarkable strength, and if care is taken in the selection of the balsa wood, the weight of the wing assembly will be only two and one-half ounces.

The stabilizer and rudder assembly is illustrated in Fig. 2. After one has had experience building up the wing, this construction will be very obvious. The surfaces are made of $\frac{1}{32}$" female balsa wood, and the whole assembly is mounted on a balsa wood saddle as with the wing. The yokes, however, are not needed here.

The piano wire undercarriage for the wheels is shown quite clearly in Fig. 4. Also the tail skid. This is made of piano wire and attached to the valve stem at the rear.

Wheels Made From Aluminum Disks

Suitable wheels can easily be made as shown in Fig. 4. Thin aluminum disks are shaped over a hardwood block and held together with a thin aluminum bush with flared ends. The tires are made of para rubber tubing—not ordinary, red, ribbed tubing. It is too heavy.

Para rubber tubing can be bought at surgical supply stores. Note how one tube is contained within the other to form an endless tire. The inner tube must be inserted while the rubber cement is slippery.

There! We have our compressed air motored plane complete, ready for a long distance flight.

MOTOR MECHANICS

Edited by RAY F. KUNS

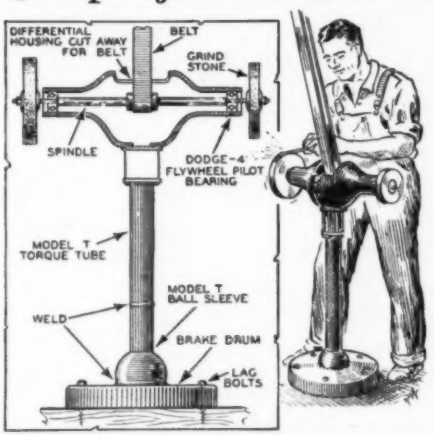
Ford Rear Axle Makes Shop Grinder Stand

IN ORDER to make yourself a handy and useful shop grinder stand, first secure an old Model T Ford rear axle and a large flywheel or brake drum. Knock out the tubes from the differential housing carrier halves. Cut out a section at the top of what was originally the rear of the housing so as to permit taking a belt drive from the line shaft above. Or if motor driven, cut out at the side so as to admit the belt.

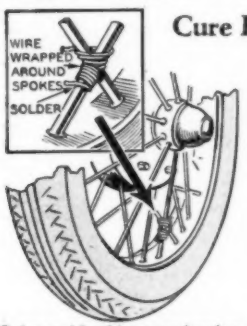
Next, cut out a section of the torque tube so as to shorten it and give a proper height to the stand. Weld the torque tube together and weld the ball to the brake drum or flywheel to provide a floor stand.

Use the lathe to make up a shaft or spindle to receive the pulley and the grinder wheels. Support the ends of the spindle on ball bearings. The ones used in the construction of the grinder stand shown at the right were pilot bearings from Dodge-four flywheels.

A couple of hefty lag bolts will hold the stand to the floor.



Torque tube, ball sleeve and brake drum are welded together to form stand as shown here. If power shaft is overhead, cut out section of differential housing to admit belt.



Balance with solder around spokes.

Cure High Speed Tramp by Balancing Wheel With Solder

HIGH speed wheel wabble, or tramp, is generally due to lack of balance in the front wheels. To cure this wabbling test the wheel on the jack, mark the heavy spot and then apply some form of weight to the opposite side of the wheel to balance the extra weight. One method used is to wrap wire solder around the wheel spokes until enough weight has been added to put the assembly in perfect balance.

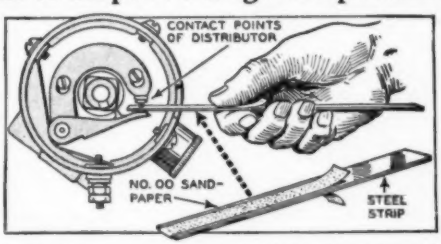
So delicately are some of the front axles designed that the least accumulation of mud on one part of the rim, which is not balanced by a similar accumulation at other points, will sometimes put the job out of balance and make driving the car at high speeds extremely hazardous. Low speed shimmy and wheel wabble come in ordinarily below 40 miles per hour, while high speed tramp comes in at 45 or more miles per hour. There are times, of course, when the two combine.

Sandpaper Distributor Contact Points to Improve Engine Operation

THE engine which is operating unevenly may be helped by having the contact points in the distributor head cleaned and sanded, after which they are adjusted to the proper gap, usually .018″ to .022″.

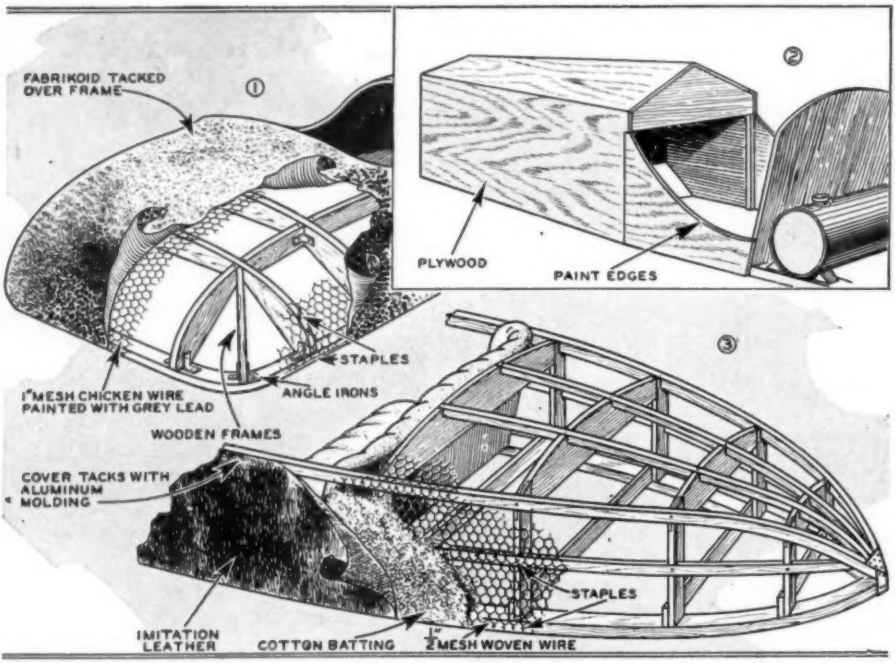
When sandpapering, take a piece of No. 00 sandpaper, ½″ wide. Fold it with the sanded side out, slip this between the contact points and work it back and forth. The pressure of the contact point spring holds the points together against the paper.

Sometimes it is advisable to remove the contact points from the distributor head, and sand or hone them on the oil stone.



In cleaning contact points, strip of No. 00 sandpaper is held over steel piece and slipped between contacts.

Body Construction Pointers



Figs. 1 and 2 show best way of applying fabrikoid cover to midget car. No. 1 gives drummy skin, No. 2 is more resilient.

YOU midget auto fans who are addicted to working out your own designs will find some good pointers on body construction on these two pages. Observe them carefully and you'll find that there won't be much work that has to be undone. Not only that but you'll have a car with a shapely body and a really artistic finish.

Knowing how you want the body to look, it is wise to begin by observing several fundamental rules in the design, and seeing that they are fully satisfied before the body is built.

These fundamentals are concerned with body room for the passengers, and with proper ventilation.

Best Proportions for Reclining Seat

The proper proportions for a reclining seat are given in Figs. 4 and 5. Long usage has found the dimensions to give satisfactory comfort. The mistakes usually made in this regard are in having too short a floor board, and not enough incline to the rear of the seat. These points are small in themselves, but are vital in riding comfort. See that the design you lay out takes them into consideration.

Ventilation streams flow as shown in Fig. 6. Unless means to clear the air out behind the motor bulkhead are provided, you'll suffer sweating and aching feet. If a bulkhead is provided (a necessity with air-cooled motors) louvres should be cut in behind the bulkhead near the foot dash.

Motor car builders found that riding comfort was increased and fatigue done away with when such ventilation was provided. The air flow, as can be seen, ordinarily leaves a pocket behind the car and a pool of comparatively stagnant air in the cockpit of the car unless a front-to-rear current is induced.

Laying Out the Body

Now to lay out the body. The plan is laid down on the floor of a garage or a basement or a clean wooden floor to full size, using chalk. The curved parts are then laid out to "flat sheet" size, that is, they are projected from the curved form to the way they will appear when in a flat sheet before bending. Needless to say, the simpler the curved form is the easier it will be to build.

The body, if it is built of sheet metal, is always built on a "plate" which anchors face to face with the topside of the chassis. In determining the shape of the body, the radiator shell forms one cross-section shape, the bulkhead behind the engine the

other, and the rear of the seat finally forms the third point. A pattern is prepared on the floor so that the shape of these three sections can be duplicated in the radiator shell, the bulkhead and the seat back.

If you are using sheet metal for the body, angle iron of ¾" sides with about 16-gauge body can be bent by sawing out v-cuts and bending to shape, finally welding the bottom of the angle as the drawing, Fig. 8, shows, so that the angle is rigid. Paper patterns for the plates of the body are then made, fitting these paper patterns (made of photo matte board, obtainable at any stationery store for 35c per sheet) to the exact form of the body as you visualize it.

Tack-weld Sheet Metal to Bulkhead

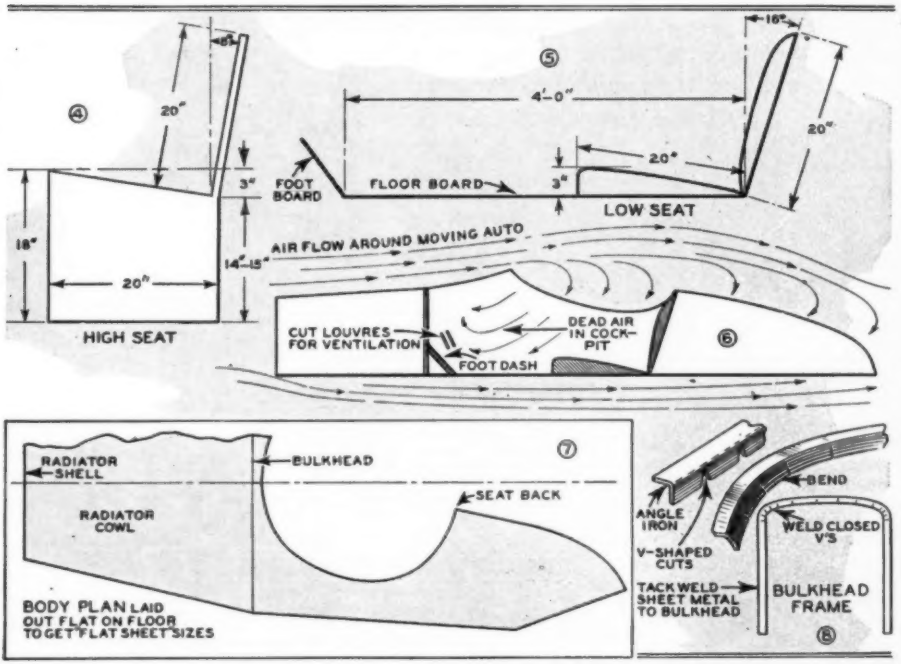
The metal will handle in substantially the same way the boards will and if you get a fit with the boards the metal can be relied upon to conform to the shape as cut from the matte board. The sheet metal can then be tack welded to the bulkhead, each sheet to the other, and finally the whole thing seam welded with a No. 0 torch, lightly handled.

Compound curves, such as bustles at the rear of a runabout body, cannot be handled by the amateur with sheet metal. Where leather is used, it is put on over a wooden framework which is cut in sections to simulate the frames of a boat as shown in Figs. 1 and 3. Then 1" mesh galvanized chicken wire is stapled tightly down over the whole framework, just as though it were going to be used as the final covering instead of the leather.

The netting is then coated with a good grade of grey lead paint to insure against rusting and excessive chafing. Inspection must be made of each of the bays in the netting to file off any projecting wires with an eye to avoiding chafe.

Putting on the Fabrikoid

Then the fabrikoid is put on. Any upholsterer will carry this in stock, or obtain it for you in attractive shades. It is pretty nearly weatherproof, and is not expensive. Enough to cover an entire midget car body can be bought for five bucks. The leather is tacked down over the framework, and coated with airplane dope, only one or two coats from the inside of the body. This will make it taut and drummy. Beading, such as is furnished by all the furniture shops, is used to finish off the rough edges. For decorative effects aluminum molding will also give a neat job.



You'll find greatest comfort if seat is built to dimensions shown in Figs. 4 and 5. Louvres shown in Fig. 6 keep feet cool.

Depression PROOF And

This house, built from plans No. 4-W-49, is no longer than a kitchenette apartment, but it's "home sweet home," and a safe refuge in times of depression. With prices low as at present the house can be built for $3000.

by **MAURICE I. FLAGG**

With material prices down to rock bottom, now is the ideal time to build. By keeping costs down you'll avoid high taxes and save "rent overhead."

WHEN we are hit by depression, incomes are lessened and taxes soar, there's only one thing to do, namely, do with less and keep the overhead down.

Even though the dollar buys 20 per cent more than it did three years ago the difficulty with most people is they have fewer dollars. Therefore, with commodities at their lowest price in years and building materials on the bargain counter, the home building proposition, for many, simmers down to the old wisecrack: "If we had some ham we'd have some ham and eggs if we had some eggs."

Things, however, may not be as bad as they seem. You've got to pay rent even in depression days. You've got to pay taxes too, either your own or a landlord's. And so if you've adopted a policy of getting along with less why not consider putting rent money into an extremely small house, at least for the time being.

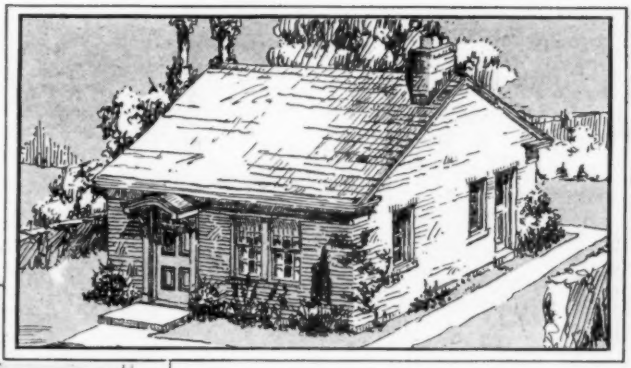
Why not build a little house, yes, a tiny house,

Closet doors with racks to hold wearing apparel, as illustrated above, effect a great saving in space, and add last word in convenience. At left is seen floor plans for home No. 4-W-49. A bed closet opening onto the living room provides extra sleeping accommodations. In other words you have two bedrooms for the price of one. There's a full basement, complete insulation, and a scuttle leading to attic storage space. For complete blueprints for this house, or house No. 3-BV-54, mail $1.00 to Modern Mechanix Home Building Editor, 529 So. 7th Street, Minneapolis, Minn.

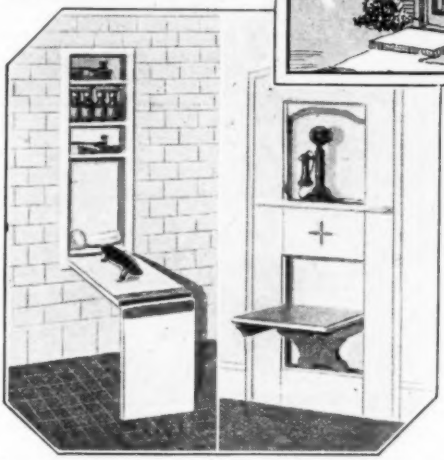
TAXES Next to Nothing

HOW TO GET A BLUE PRINT AND TWO PLAN BOOKS

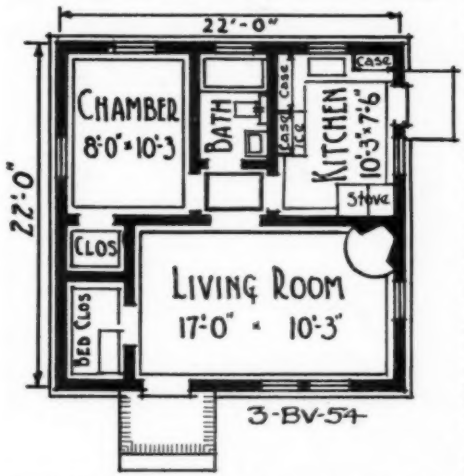
A one-sheet blue print of any house appearing in Modern Mechanix and Inventions magazine may be had for $1.00, postage prepaid. Two new plan books, "Homes for Newlyweds," containing 32 of the latest ideas for low cost homes in all styles, and "16 Selected Homes for Lean Purses" containing time, space, and labor-saving bungalows, may be had for 15 cents each, or both books for 25 cents, postage prepaid. Address Home Building Editor, Modern Mechanix and Inventions Magazine, Minneapolis, Minn.



Ideal for small family is this home, built from plan No. 3-BV-54, which sets on rear of lot. When good times return the house can be converted into a two-car garage.



Space-saving arrangements such as illustrated here are a boon to the two small homes shown on these pages.



Floor plans for home No. 3-BV-54, shown at top of page. One flue is used for living room fireplace and kitchen stove.

just outside the city limits where taxes are less or a few miles out in the country where land costs less. Perhaps like many you may own a good lot but are paying rent for a small city flat. Why not put your idle lot to work for yourself when a few hundred dollars is all that's necessary to get started?

Tabloid type houses like either of those here illustrated offer as much comfort and convenience as small city apartments; and what's more, if built on your own property, there are advantages that can't possibly be had by renting.

Garden Will Reduce Expenses

For one thing you can raise a garden and produce food. Many a small home owner no doubt regards the money he puts into a house, lot and garden as a Rock of Gibraltar these days of smaller incomes and uncertainty.

Take a garden for example. Vegetables, fruits and food stuffs grow yearly whether times are good or bad. A garden knows nothing about depressions. Take a 50-foot lot of ten years ago. It's the same size today. The size doesn't shrink even though the value may be temporarily lessened due to values in general.

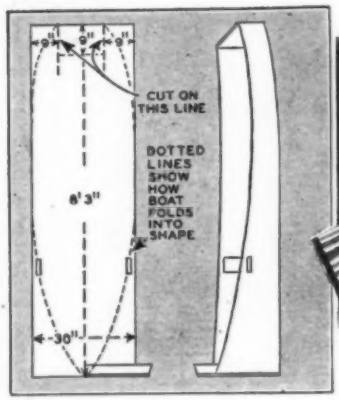
Even though business conditions may be bad and investments uncertain, property of the kind I'm suggesting can't equal the shrinkage of many securities the past three years.

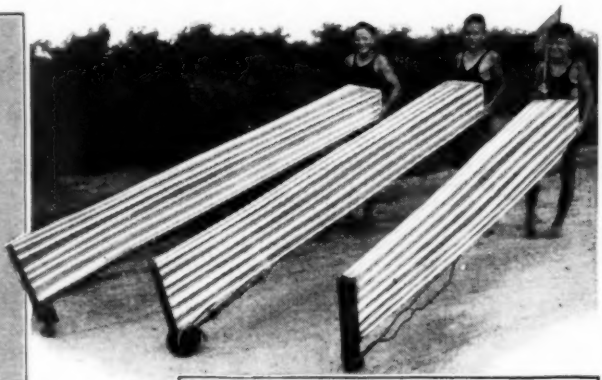
A little house built on an inexpensive lot will get you out from under "rent overhead" to a landlord. Taxes will be low because your investment will be small. And there's a lot of satisfaction in knowing that whatever may happen you are safely entrenched in a little kingdom of your own.

Plan No. 4-W-49 is no larger than many kitchenette apartments but because it is a detached dwelling on a lot of its own it is

(Continued on page 150)

Tin Can Canoe Rolls to Lake





Hull of the canoe is formed from piece of sheet iron 9'x2'-6" cut to the shape shown here. Stern has two 9" slits, with mid-section bent up to form the transom.

A "TIN CAN" canoe that is both economical in cost of materials and simple in construction has been devised by three San Antonio, Texas, boys. And, in addition, they have originated a unique and inexpensive method of getting their craft to and from the lake or river.

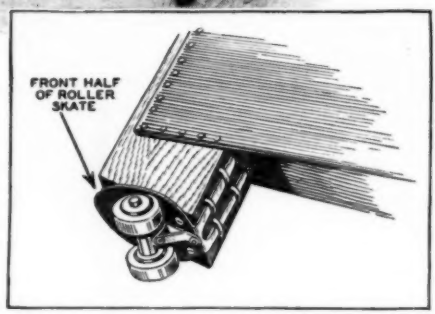
As pictured above, each sheet-iron canoe is provided with wheels from old discarded skates, attached at the bow, and the boats are simply turned up-side-down and rolled to and from the water.

The canoe is built of a piece of old sheet iron 9'x2'-6" in size. The first step is to cut, in one end of the sheet, two parallel slits, 12 inches apart, 9 inches deep, and 9 inches from the outer edges of the sheet. A 9"x12" board is then fitted over the center piece and the sheet iron nailed to it. This piece is then bent to a ninety-degree angle, with the board on the inside.

The two projecting outer pieces are then bent inward and the outer edges of the sheet forced upward against, and nailed to, the edges of the board, with corrugations flattened. The two nine by twelve sections are then nailed firmly to the board.

A 2x4 is then nailed flush with the other end of the sheet, extending from a point within two inches of the center and several inches beyond the outer edge. This side and the other side of the sheet are then bent upward and brought together and both sides nailed firmly to the 2x4. The canoe is now pretty well fashioned into shape. It should be spread out a few inches, three feet or so back from the bow and a brace nailed in for rigidity.

Paving tar or roofing cement is used to make the craft waterproof. Also, nail holes are plugged and made tight with lead or "pan patches."



Here is how roller skate is attached to the 2x4 in the bow for transportation purposes. Screws pass through two holes punched in base behind the wheels, and prongs are bent up.

The sharp edges of the sheet iron should be turned with pliers and hammered down to avoid injury to the hands.

Next a discarded skate, with the front wheels in good condition, is secured. The front and rear sections are disconnected, the foot adjustment is removed, and the screw-set knocked out. The rubber "setting" under the axle base is removed to give more play to the wheels.

Two holes are punched in the base of the skate behind the wheels. It is then placed upside-down on the sawed-off end of the 2x4, with the point forward, and made fast with long screws.

The two projecting prongs are then bent down and made fast against the edge of the 2x4 with big-headed nails or staples.

In order to make the canoe easily located in case it capsizes and sinks to the bottom, a float made from a light weight board and attached to a rope should be carried. The rope is tied to the 2x4 in the bow. When canoeing, the float rides free in the craft, but when "in transit" to and from the water it is hooked on one end to the 2x4 and on the other to the brace. An old gate hook can be adjusted to this purpose.

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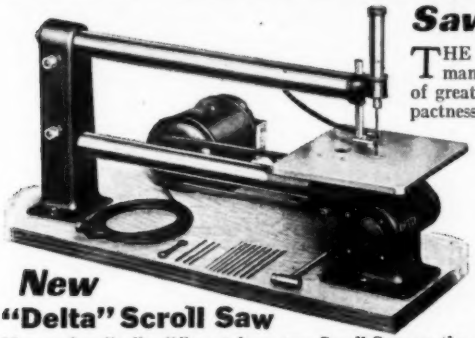
New Tools for Woodworkers



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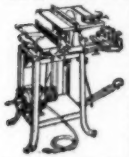

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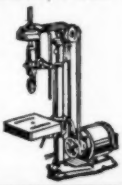

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Hazards of Boring Longest Tunnel

(Continued from page 42)

of rock and after baking it, they dashed huge quantities of cold vinegar against the crusting stone to shatter it, as a sudden switch from hot to cold temperature will burst a kitchen glass. Their success was nil, however.

Compressed Air Drills Introduced by U. S.

It was not until the middle of the last century that American mechanics first introduced the principles of compressed air drills and nitroglycerine. This was in building the Hoosac Tunnel on the Fitchburg Railroad in Massachusetts.

After the way was shown by the American mechanics, it was easy to build the famous Saint Gothard Tunnel in Switzerland in 1881. This is not a straightaway bore, but it spirals upward toward the summit of the mountain.

In 1905 the 12-mile Simplon Tunnel, from Brigue, Switzerland, to Iselle, Italy, was completed. Here the hazards were illimitable and unimaginable. The giant forces of nature bolted against man's defiance. The worker's path was encumbered with crumbling gneiss, treacherous mica formations and limestone. Thousands of gallons of icy water spouted into the tunnel from the Swiss side and a gusher of hot water flooded it from the French end.

As a climax to the series of ostensibly insurmountable obstacles, the gigantic, crushing weight of the mountain buckled the floor of the tunnel. Nevertheless the workers persevered and the tunnel today represents an eternal monument to its engineers.

Members of the recent International Geologists Congress considered plans for boring through Mont Blanc, 14 miles through the base. Mont Blanc is 15,771 feet above sea level.

Tunnel Under Gibraltar Proposed

The piercing of a tunnel through the Strait of Gibraltar, for an undersea route linking the Spanish mainland with the Cairo Railroad, is represented in the plans of M. J. Berlier, who engineered two tunnels under the Seine River. Carlos Ibanez, a Spanish engineer, is also seeking to interest the French and Spanish governments in the Gibraltar project.

South American countries have been making great use of the tunnel as an agency of convenience and economy. A note of tragedy crept into one of the Chilean tunnel projects recently, however, when fifty muckers were buried alive because of a land fault at the entrance of Las Raices Tunnel, near Longquinay, on the route of the new Southern Railroad through the Andes. The landslide had been loosened by the filtration of water.

After four days of feverish rescue work by 800 men, all of the men were finally brought out alive, though the chances of some to survive were pronounced as "slight" by doctors on hand. A month

(Continued on page 151)

AN OPEN SECRET

Only the other day a busy housewife went to her door to answer the call of a neighbor. She was surprised, after a few preliminary words, to learn that Mrs. R. represented the Health-O Quality Products Co. She had never seen so attractive, so reasonably priced, so nicely packaged, food products, toiletries, medicines and household necessities.—And, as Mrs. R. so tactfully explained, quality guaranteed by the maker's integrity. It was so convenient to select what she wanted to be delivered right to her home as she pleased. Health-O Quality Factory-fresh Products have a good name and a sterling reputation to live up to—THEY MUST BE GOOD. Gift coupons are placed in every package and it is so easy to get valuable household helps and appliances with these coupons without a cent of additional cost. Ask the Health-O representative to explain.

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(Continued from page 145)

"Home Sweet Home." It is an all wood affair, the least expensive type of construction. A 35-foot lot is required. There is a large living room stretching across the entire front of the house. Also one bedroom, a dinette, kitchen and bathroom on the first floor.

A bedcloset opening into the living room offers added sleeping accommodations if required. In other words you have two-bedroom equipment at the price of one. A scuttle from the rear hall ceiling opens into large storage space beneath the roof. There's a full basement, complete insulation, and exterior walls are shingle. Roof may be either wood shingles or composition.

What about the cost? Considering present day prices this house should be in the $3000 price range. It may be more and maybe less, depending upon the equipment and materials. If you are able to do some of the work yourself there will be a considerable saving. The plan is compact and the house almost depression proof as far as shrinkage in value is concerned.

Plan No. 3-BV-54 was designed to be built at the rear of a lot and later converted into a two-car garage. As shown it is brick veneer but can just as easily be frame with siding exterior and shingle roof. You can build it without a cellar.

While there is only one bedroom a bed closet opens off the living room and provides two bedroom service. The house is small to be sure. It was planned that way for two reasons. First for low cost, second for a small family.

A corner fireplace or one of the newer first floor heaters built to look like furniture will keep you warm. The chimney has two flues, one for the range and the other for the fireplace or heater. Storage space above is reached by a hatchway from the hall.

The designer says $2200 is the price range in brick veneer. It will cost less if built of wood. If, as I have said before, you can do some of the work yourself, there will be added savings.

I have shown you two diminutive houses, tiny houses that in many ways are almost depression and tax proof. Each offers modern conveniences, many comforts, and no special privations. Both are simple and without the frills and ostentation which cost money.

Because these are days when most people are willing to do without the boom day showmanship required in small houses, tabloid types or others like them may point the way to those who want to get out from under "rent overhead" and make rent money build their own home. Hope you like the plans.

Causes of Deaths to N. Y. Children

REMARKABLE shifts in the causes of deaths to New York children have been noted in latest statistics. Pneumonia causes bulk of deaths to 5 year olds; various forms of infection take off bulk of youngsters five to 14. Most accidental deaths between the ages of 5 and 14 are caused by automobiles. These deaths are heaviest in the slums.

Hazards of Boring Longest Tunnel

(Continued from page 149)

before, this same region was in the midst of volcanic eruptions.

In volcanic Japan, where the forces of Nature are paramount, there has been considerable controversy raging as to whether the Japanese Government Railways should be permitted to proceed with the remaining 3,000 feet of the now famous Tanna Tunnel.

Earthquake Destroys Tunnel

Experts who visited the scene when the whole of the mountainous Idzu peninsula and part of the Hakone region were subject to severe earthquake shocks, reported that the center of the tunnel had disappeared and that a great chasm remained in its place.

On the contrary, the Minister of Railways and another group of engineers made a tour of inspection of the tunnel and reported that the damage was slight and could be easily repaired. Public anxiety rose to panicky proportions after the perils of completing the Tanna Tunnel were exposed.

As 20 million yen, about $10,000,000 had already been expended, it was decided to complete The Tanna. The engineers and mechanics on the project came to the conclusion that the natural hazards were not to be accepted as something inevitable against which it would be vain to fight. It was pointed out that in Japan they must build in full consciousness that they are working against the destructive powers of Nature.

Gravity Puzzle Prize Winner

(Continued from page 47)

be proven in any physics laboratory by showing that, in a partial vacuum, a feather will fall just as fast as a lead shot.

Many other letters ranked high in the judges' opinions, but lack of space won't permit their publication. Outstanding among the high-ranking contributors were Karl F. Steinhauer, Hurley A. Low, Kenneth Wallaeger, Clifford Maloney, Alvin H. Wilkinson, J. A. Kopley, W. W. Ayers, Roger Sawyer, J. Milburn, James McCleary, Paul Lahr, R. H. Cunningham, Alvin C. Brehob, and two William H. Harris's, one of Terre Haute, Ind., and another of Edmonds, Wash.

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Target Range for Your Basement

(Continued from page 127)

At either end of the carriage are hooks to which a flexible steel cable—or curtain cord—is attached. At the target pit this cable goes around a stationary pulley and a movable pulley, after which it continues back along the roof of the trench to the shooting pit. There the cable goes through another stationary pulley and a moveable pulley and around a sewing machine wheel which has been lined with electrical rubber tape to keep the cable from slipping.

From the wheel the cable goes through another set of pulleys, after which it is attached to the target-carrying carriage. Thus the cable is continuous except for the space of the carriage, making it possible to move the carriage and target to and from the shooting pit by simply turning the wheel in one direction or the other.

Target illumination is furnished by two 50 to 100-watt lamps with white reflectors set in the sides of the trench just in front of the target pit, approximately three feet from the target. Metal conduits will make it possible and safe to have the switches at the shooting pit.

In the shooting pit an adjustable platform may be raised and lowered for prone or sitting position fire. A series of grooves will make almost any height convenient.

Description here has been sketchy, but the home target range presents an interesting case of adaptation for the man who likes to build things. It would be impossible in so brief an article to solve every problem of construction which individual cases may present, but all fundamental details are clearly set forth here.

For smaller boys who want to construct a basement rifle range, to shoot with air rifles, the matter is a much simpler one.

The first requisite is to get a clear shooting space of at least 25 feet, with a solid backing of some kind to stop the shots. A stone or brick wall, or even a wood or dirt backstop will serve. Hang up a piece of canvas or old carpet. In front of this build a wooden railing about 5 feet above the ground, wide enough to hold small objects, such as old plates, bottles, etc., which make excellent targets.

If a more formal target is desired, one of the leading manufacturers of air rifles has produced a target made of a small folding steel box, in which regulation target cards can be inserted. This steel target mounted on the railing as described will furnish many hours of keen competition for the young marksman. A drop light should be hung immediately over the target if natural light does not fall directly on it. After all, clear vision is the first element of good shooting.

A rail built as a gun rest, built where the shooters stand, will improve their skill, and add to their pleasure.

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"Sea Skeeter" for Young Mariners

(Continued from page 125)

Plane the mast from a full 2 in. by 2 in. piece of spruce 7 ft. 9 in. long, tapering it from 2 in. at the bottom to 1¼ in. at the tip. The boom should be of the same material, 1½ in. tapering to 1 in., and is coupled to mast with eye-bolts, as shown in Fig. 2.

Dimensions of the sail are given in Fig. 1, 24-in. widths of 12-oz. duck being used. Spruce or bamboo splints are sewn into the cloth. Manner of rigging to mast and boom is illustrated in Fig. 2.

Either grommets are used, spaced 6 in. apart, or cords are sewn directly to the hem of the canvas. In either case the rigging is stationary as no halyards are used to raise or lower the sail, the entire assembly being lifted out when required, or boom simply folded up against mast and sail wrapped around it and tied.

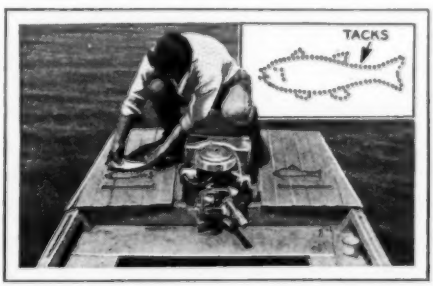
The mast-step is simply made as shown in the drawing. Note that it tapers on two sides only, for easy construction.

Give the hull a first class paint job, inside and out. A light gray is a good inside color, with the outside a choice of pea-green, canary yellow, cream or white. In the case of the two last use a bright red below the water line, and in any event be sure to give the hull two coats of spar varnish, outside at least. Varnish on mast and boom is also desirable. Canoe paddles can be purchased at a mail order house cheaper than you can make one.

Markers Tell Legality of Fish

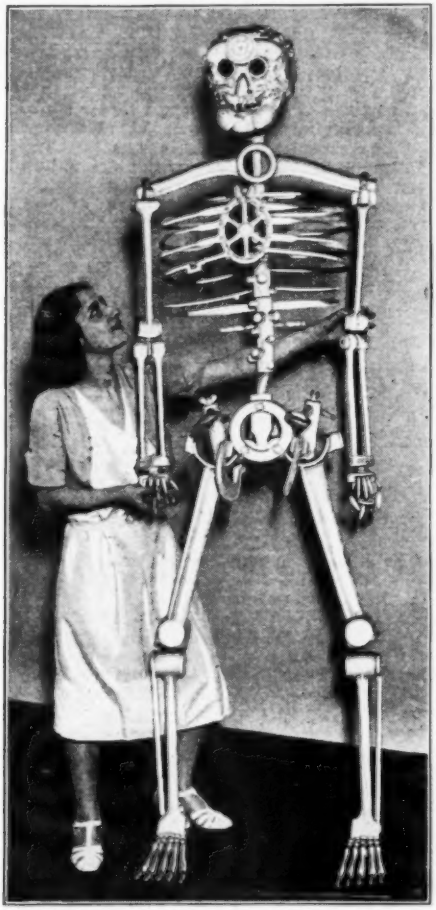
IN STATES where fishing laws are rigidly enforced, fishermen can save themselves from unpleasant encounters with the game wardens by painting a measuring mark for fish on their boats. Thus, when a fish is caught that looks undersized, it can be immediately measured, and thrown back in if regulations so demand.

Illustrated below is one method of marking out a measuring form on your boat. Simply outline the legal size of the bass on the deck with tacks or paint, whichever you may wish. Such a scheme eliminates all guesswork, for it shows at a glance whether the fish is legal. If undersized it should be returned to the lake immediately.



Legality of fish can be quickly determined by measuring it on silhouette size marker formed on deck with tacks.

Skeleton Has Mechanical Bones



With skull composed of everything from sewing machine bobbins to rifle trigger, and body of connecting rods, springs and vises, skeleton draws attention to manufacturer's products.

ALL honors for devising a novel way to attract trade go to a manufacturing concern in Hartford, Connecticut. The stunt they performed was the construction of an amazingly realistic skeleton from parts turned out at the plant. The creation is shown above. You will have to look closely to see that it does not have real bones.

The skull is composed of everything from sewing machine bobbins to triggers for rifles, while the body of the structure is formed from connecting rods, springs, vises, and other parts from the mechanical world. What is most astounding, however, is that the arms and legs may be moved as if they were hinged with real joints. Man of the future may have a frame like this.

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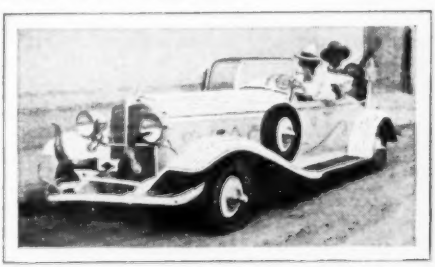
Here's Latest Auto Building Feat

AN AUTOMOBILE made up from parts of 13 junked cars, and built by a south Texas farm youth with only a set of blacksmith tools, is a sensation wherever it appears in the Lone Star States.

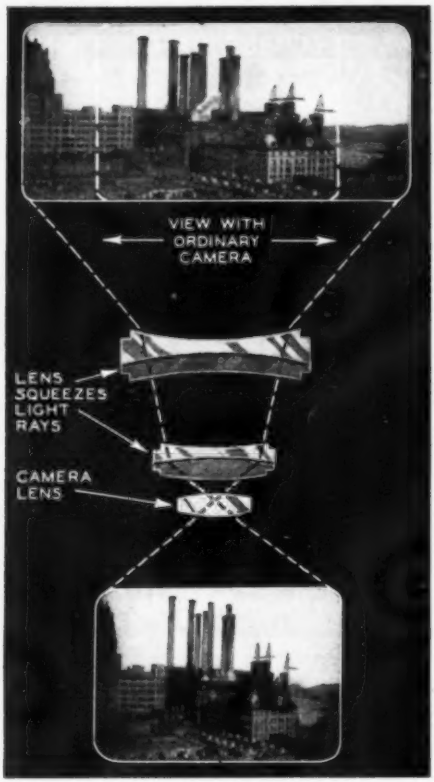
Shown below, the roadster is finished in gloss white and trimmed with 2,300 silvered harness studs in various patterns. On clear roads a speed of more than 90 m.p.h. is developed, under the urging of a six-cylinder motor of standard make. 20x4 airplane tires do duty on the wheels.

A pair of steer horns are mounted on the radiator for decoration.



Here's a new feat of auto construction. This keen looking machine was built from old parts with only a set of blacksmith's tools. It does 90 m.p.h. on its airplane wheels.

Lens Squeezes Panoramic Scene



Combination of concave and convex lenses in new accessory for taking panoramic shots with an ordinary camera compresses view into half normal width as illustrated above.

INTRODUCTION of a new photographic lens permits the taking of panoramic shots with an ordinary camera. As illustrated in the drawing above, the lens is so ground that it squeezes the light rays into a narrow area, reducing the width of the scene by one-half. Incredible as it may seem, there is very slight distortion, as the example shown above well illustrates. The new lens comes as an accessory and may be attached to the front of the camera, before the regular lens.

Men Better Figurers Than Women

PSYCHOLOGISTS at a German University have been carrying out tests to determine the respective mathematical abilities of men and women. Investigators discovered that the percentages of mistakes made, the average time required for calculation and the amount of fatigue created are all greater among women and girls than among men and boys. It is noteworthy that there have never been any great women mathematicians.

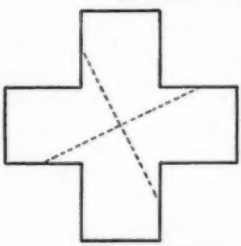
Answers to Puzzles

Here are the correct answers to the puzzles which appear on page 79 of this issue:

REVOLVING COINS

The top coin makes two revolutions on its own axis in rolling once around the lower coin. To prove this, make a mark at the top of the top coin and roll it halfway around the lower. You will find that the mark is again at the top, showing that one complete revolution has been made. Continuing around completes the second revolution. To get technical, the rolling coin has a compound motion; it revolves in a large circle while turning in a circle of its own size, and the sum of these motions equals two revolutions.

SQUARES AND CROSSES



The cuts necessary to make a Greek cross into a square by forming only four pieces of the same size and shape are shown at the left. Each cut is from the middle point of one side of an arm to the middle point of the other side of the opposite arm.

THE DIGIT PUZZLE

The solution usually given is as follows:

$1+2+3+4+5+6+7+(8x9)=100$

Here are two others:

$(1+2-3-4)\quad(5-6-7-8-9)=100$

$12+3-4+5+67+8+9=100$

The best solution ever made—meaning by "best" the one using the fewest signs—is this:

$123-45-67+89=100$

THE THREE CLOCKS

Of course the clocks have to keep going 720 days to register the same time again—one has to gain twelve hours at the rate of a minute a day, and the other has to lose twelve hours at the same rate, and there are 720 minutes in twelve hours, and so—but the difficulty lies in the date. 720 days after April 1, 1898, is not at all difficult to figure out—but the year 1900, although exactly divisible by 4, was not a leap year. That was the point that required step-watching. Counting only 28 days in February, 1900, instead of the 29 it would have had if the year had been a leap year, brings us to March 22, 1900, at noon, which is the correct answer.

WORD JUMPING

From BOAT to CREW in five jumps: boat, brat, brag, crag, craw, crew.

From BLACK to WHITE in eight jumps: black, clack, click, chick, thick, thine, whine, white.

From SEVEN to EIGHT in twelve jumps: seven, sever, lever, level, revel, revet, reset, beset, besot, begot, bigot, bight, eight.

Depression Profits From Workbench

(Continued from page 120)

know that desk blotters have an annoying way of curling up.

To begin with, a sheet of lead 1/16 in. thick by about 14 in. square should be obtained from the local plumbing shop. As shown in Fig. 5, lay out

on cardboard two patterns for the front and back pieces, and trace four of each piece on a sheet of lead. If a pair of tin shears are not available the lead may be cut out with a heavy pocket knife.

The square edges of the front pieces should be hammered down carefully over a piece of some hard metal about 1/16 in. thick to form a recess into which the blotter is inserted when the two pieces are assembled.

After this is done, place one of the front pieces on top of a back piece so that the outer edge is even, then drive three No. 16 escutcheon pins down through the outer edge, and cut off the head over the back.

One or two ordinary desk blotters with these corners attached will stay where put, and will dress up any desk.

Now if your potential customers are seeking novelty in particular, you can do nothing better than play up the one-hand lamp clock shown in Fig. 6. It's as accurate a timepiece as you could want, and it makes a highly ornamental table lamp.

The lamp should be 15 to 18 inches in height, with a two bulb bracket, which has a small knob at the top to take the shade. Now to this knob that holds the shade is assigned the job of holding the clock bracket, which must be of the same size as the back of the clock. The clock must fit flat in this base and be as level as possible to allow the lamp shade to turn even around the pointer arm.

The pointer should be fastened stationary to the bottom of the clock bracket and should be constructed of polished tin, brass, or aluminum, with an arrow pointer as a hand to register on the side of the shade.

Now comes the shade, which acts as the dial of the clock. It must be calibrated as accurately as the minute points on the face of the clock. First place the shade of the lamp you use on a piece of paper and draw a circle around the base, thus getting the exact circumference for your divisions.

These divisions are first marked off in twelve equal points, to give the hours. Mark off the hour sections into 12 smaller sections to give the five minute points.

Now place the shade back on the paper and with a fine brush and white paint mark dots on the minute points and lines on the hour, half hour, and quarter hour points. Next cut the figures off an old clock and paste them on in regular order on the hour lines, as shown in the photo (Fig. 6).

The next point of construction is securing the shade of the lamp to the clock. A small brass tube is used, one that will fit snugly over the shaft of the hour hand only. This tube should not be over an inch long, and the top should be soldered to the top of the lamp shade in the center.

Place the shade firmly on the shaft of the hour hand and the shade will move around with the hour hand shaft. The stationary pointer will indicate the time by the calibrations on the side of the shade. To wind the clock, lift out of bracket, wind and replace, setting the time by turning the shade to the correct time with the pointer on side of shade. When the lights are on in the lamp the effect of the clock is wonderful.

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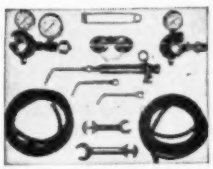

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Read Mechanical Package Magazine advertisement on Page 36

Daring Death With Aerial Acrobats

(Continued from page 58)

rium. As this third man is adjusting the chair on the pole carried on his brothers' shoulders, their sister comes along and she advances to take her place on the third man's shoulders. The latter is seated on the back prop of the chair when she mounts to his shoulders.

The final tableau finds the third brother standing on the chair, still balanced on the cross-bar between the two brothers, and their sister is poised on the third man's shoulders.

Although the triple somersault has killed more circus performers than all other acts combined, the feat of the Wallendas is regarded as one of the most dangerous ever undertaken. They do their bit at a height around 60 feet. Here again the net would be a feeble and practically worthless safeguard if the troupe came tumbling down. Their poles would unquestionably do serious harm.

Several years ago George Lenke and Hans Benkuhn used to give circus audiences spells of vertigo through their antics of riding bicycles on high wires and at the same time shooting out electric bulbs. Their defiance of all natural and physical laws ended in tragedy. Lenke was killed in a fall.

Ernie and Charlie Clarke were great leapers, too, up to a few years ago. Ernie culminated his career with the achievement of a double somersault and then a pirouette. It took him four years to perfect this.

Ernie discovered that it always took him four seconds to complete the double somersault. At the end of that time his momentum was spent. He concentrated on clipping time from the two somersaults so that he would have enough speed left to go into a pirouette. He finally succeeded in chipping off a half-second for the pirouette. They had spills and close shaves galore with the Grim Reaper in perfecting this act, which had the customers gasping for years.

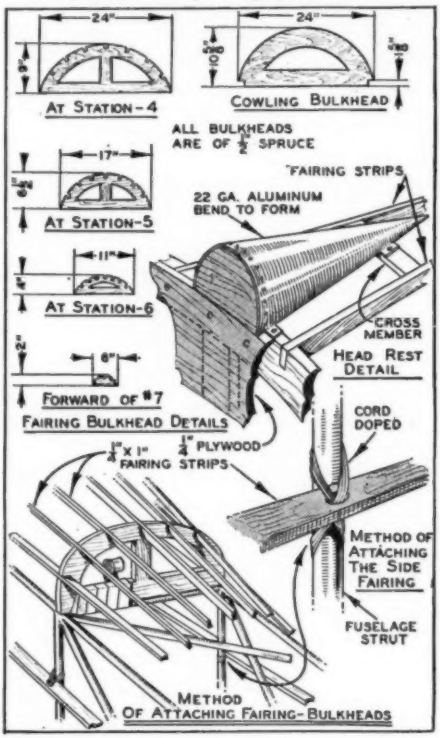
Madame Codona's latest accident occurred when a breakaway—a braided rope which unravels—broke as she leaped from a trapeze to a platform, fifty feet below. If the rope had not broken she would have landed on her feet. She was in four bad falls during one London season —all the result of little slips.

Continents Dance to Cosmic Tune

THAT the continents dance majestically back and forth over the earth's surface in tune with the sunspots, executing one back and forth "step" of fifty feet or so every eleven years, is the revolutionary suggestion of a Russian astronomer and geographer. The evidence for his conclusion comes from the precise measurements of the differences in longtitude between the different continents which have been conducted for the past twelve years by international agreement. The idea that the continents may be movable is now well known, following the theories of slow continental drift proposed by the distinguished German geologist, the late Professor Alfred Wegener.

Plans for the Gere Sport Biplane

(Continued from page 113)



Details necessary to complete the turtle deck, the streamlined head rest and the side fairing are shown on this plate. Note the doped cord method of attaching the side fairing.

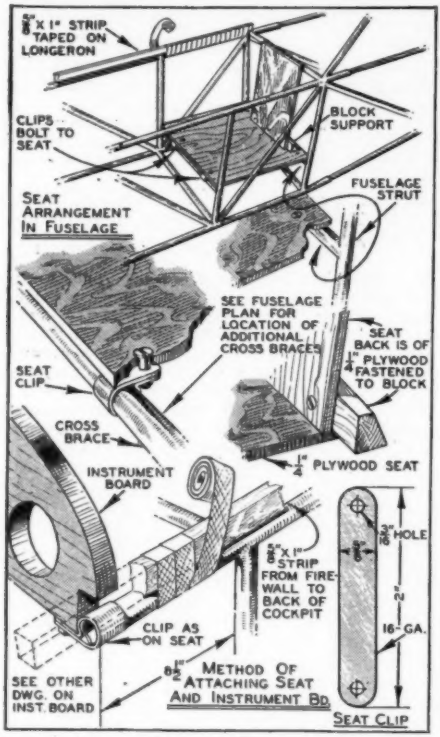
M M, where this particular mount is described in the Sky Scout article.

Although the Chevrolet engine is not recommended, we feel that there will be a number of builders who may wish to install this engine temporarily. The plans for this mount are consequently given in some detail. One more word on the subject of Ford conversion motor mounts—and Chevrolet. If either of these motors is used, it should be set back a full four inches more than the plans show. This change is the result of test flights made since the plans were drawn. In any case, the best bet is to leave the motor mounting and cowling until the very last, as the only practical way to establish a perfect balance is by moving the motor an inch or so forward or backward until the proper position is found and checked.

Fairing and Cockpit Details

With the fuselage now completed in skeleton form, landing gear in place, and all fuselage fittings securely welded in position, the next logical step is to construct the turtle deck, attach the side fairing and install the seat. All these operations are described in minute detail in the drawings. The instrument board may also be cut to

Plans for the Gere Sport Biplane


⅝" X 1" STRIP TAPED ON LONGERON
CLIPS BOLT TO SEAT
BLOCK SUPPORT
FUSELAGE STRUT
SEAT ARRANGEMENT IN FUSELAGE
SEE FUSELAGE PLAN FOR LOCATION OF ADDITIONAL CROSS BRACES
SEAT BACK IS OF ¼" PLYWOOD FASTENED TO BLOCK
SEAT CLIP
CROSS BRACE
INSTRUMENT BOARD
¼" PLYWOOD SEAT
⅝" X 1" STRIP FROM FIRE-WALL TO BACK OF COCKPIT
⅝" HOLE
2"
CLIP AS ON SEAT
16-GA.
6½" METHOD OF ATTACHING SEAT AND INSTRUMENT BD.
SEE OTHER DWG. ON INST. BOARD
SEAT CLIP

Seat construction and further details of the instrument board and its manner of attachment are shown in this plate. Tape is used to bind wooden members to longerons.

shape and fitted in place. The cowling forward of the pilot's cockpit can be forgotten for the time being, as there still remains a good deal to be done inside the fuselage itself. Some of these, the control system, the gas tank, etc., and also the wings and the tail surfaces will be the subject of the second and concluding article dealing with the Gere plane.

Specifications for Gere Sport Biplane

Length overall (depending on motor used)	approximately 16 ft.
Span, Upper Wing	19 ft.
Span, Lower Wing	18 ft.
Chord, Upper and lower wing	36 in.
Stagger	17 in.
Angle of Incidence, Upper	0°
Angle of Incidence, Lower	1½°
Dihedral, Upper	0°
Dihedral, Lower	2½°
Maximum Speed, with Ford A Motor	80 m.p.h.
Maximum Speed, with Ford T Motor	75 m.p.h.
Maximum Speed, with Szekely 40	95-110 m.p.h.

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Build Your Own Light Plane!
Flying and Glider Manual, 50c

Fortune Making Ideas for Inventors

(Continued from page 89)

mechanically and perhaps it is possible to accomplish the trick chemically. At any rate there would be a big reward for the fellow who can solve the problem in a practical manner.

Specifications: Should be made to retail at $2.00 at the most and should preferably be small enough to carry in one's pocket, although this is not a necessity.

Exploitation: Should be sold on a royalty basis with $10,000 as down payment.

4. Automatic Cellar Light Switch

Many millions of dollars are added to the annual lighting bills of the United States because people permit electric lights to burn for many unneeded hours. The worst offender in this respect is the cellar light. It is constantly forgotten and even though it is in the cellar it probably costs as much to operate as any light in the house.

There is a grand opportunity to invent a simple and inexpensive little time switch which may be adjusted so that the cellar light will remain on for any length of time up to one hour. Then there should also be a shunting switch which would cut the time switch out and permit the user of the light to have light for an indefinite period. With the time switch in the circuit, the light or lights would remain on for a definite period and then automatically go out.

Specifications: Many thousands of these little devices would be sold if they could be made for as little as thirty-five to forty cents, which would give a retail price of one dollar. The device should be simple and it must pass every underwriter's approval before it can be introduced in the United States.

Exploitation: Should be sold for a sizeable down payment in cash and the rest in royalty.

5. Ventilated Electric Socket

One of the most urgent problems of the electric industry is that of producing a heat-proof, ventilated socket for use with some of the newer high power incandescent lamps. The ordinary socket is not really fitted for this service and it has been found most difficult to produce a socket that will be immune to the action of the heat.

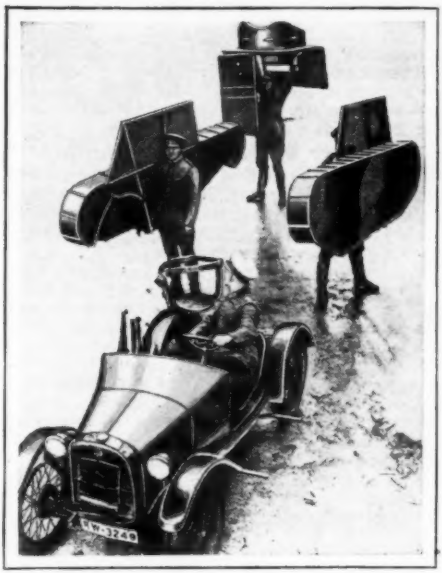
A socket that will be able to withstand the continuous heat from 500 and 1000 watt lamps without showing undue wear is in demand. Some clever method of heat dissipation is needed. Perhaps it may be done by fins similar to the method used in air-cooled gasoline engines. At any rate the excessive heat must be permitted to leak off into the surrounding atmosphere in some way.

Specifications: The best the would-be inventor can do is to consult one of the Underwriters offices and ask the experts there just what is needed and perhaps some good ideas will be given.

Naturally, little or nothing should be added to the cost of sockets. What the problem will involve is a new method of making sockets that will not require more material, but yet will keep the socket temperature down below a critical point when it is used with the higher wattage lamps.

(Continued on page 160)

Sham Tanks Fight Sham Battles



These imitation tanks, permitted the German military under the terms of the Versailles Treaty, have demountable wooden sides and turrets, and are used for mock battle maneuvers.

SINCE the termination of the World war and the signing of the Versailles Treaty, Germany has been forbidden to build any tanks for war purposes. Laboring under these restrictions, German military and mechanical ingenuity combined to remedy the situation and the result was the introduction of the demountable tanks shown in the photo above. While they wouldn't stand much punishment on the battlefield, yet they do prove highly effective for mock maneuvers and sham battles. The tank really amounts to a bit of clever camouflage, it being no more than an auto chassis with imitation treads and turret.

Most Deadly Spot in Human Body

ONE of the rarest of human accidents, the sudden death of an individual from a slight blow on the side of the neck which happens to touch and stimulate the vagus nerve, occurred recently in London.

Two caddies got into an argument and one struck the other a light blow on the side of the neck, just below the ear. The young man who was struck keeled over and died instantly.

Explanation given by medical men was that the light blow happened to touch what is probably the most sensitive and dangerous spot on the human body, a tiny area on the side of the neck where the vagus, or pneumogastric nerve, lies just under the skin. This nerve is one of the two through which the brain controls the heart.

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30x5.25-20" 2.95 1.25
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28x5.50-18" 3.20 1.30
29x5.50-19" 3.20 1.30
30x5.50-20" 3.20 1.30
31x5.50-21" 3.20 1.30
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Order 2 Tires Get Guaranteed Tube FREE
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Send $1.00 Deposit with each tire ordered. Balance C. O. D. If you send cash in full deduct 5%. You are guaranteed a year's service or replacement at ½ price.
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Thread cutting lathe and Countershaft $55.00, use lever in gearbox to shift carriage while cutting threads. 12" Band Saw with tilting table $25.00. Send for Catalogue on these and other machines.

ROSSBACHER MACHINE CO.
1516B Fernwood Ave., Toledo, Ohio

Fortune Making Ideas for Inventors

(Continued from page 158)

Exploitation: I hesitate to say just what such an invention would be worth. However, when one thinks of the countless millions of electric light sockets in the United States alone one cannot get pessimistic about the money that might come from such a successful invention.

6. Garter With Durable Elastic

Here is a problem that should be solved for the suffering male part of the human race. What man is not constantly and everlastingly adjusting his garters to increase the elasticity and why is it that garters wear out so quickly?

What is needed is a rubberless garter, one that can be adjusted forever and anon without wear and that will have no tendency to cut off the circulation of blood in the legs. The new garter should also be sanitary and washable.

Specifications: What is really needed is a revolutionary method of holding up the socks. The cost may be about the same as the present cost of a good pair of sock holders; in other words, fifty cents.

Exploitation: Should be sold on a strict royalty basis to one of the larger producers of men's garters.

7. Self-cleaning Typewriter

There is an urgent need for a typewriter that will clean its own type. As typewriters are used, small pieces of lint and ink come off the ribbon and get lodged in the letters making frequent cleaning of the keys a necessity.

Some sort of a simple little cleaning device is needed that will keep the keys free from particles and in such condition that they will make clean letters on paper.

Specifications: That device may cost as much as fifty cents—that is, it may add as much as fifty cents to the cost of making a typewriter and it should be realized that this is a great deal of money. It should in no way interfere with the operation of the machine and should place no obstacle in the path of the keys.

Exploitation: Should be licensed to all of the large typewriter manufacturers.

8. A Big Problem of the Auto Radio

Auto radios have not been as successful as they might have been for the reason that they are too costly. The reason for this added expense is that only six volts direct current is available in an automobile and this means there is no practical way of producing the high voltage for the plates of the tubes and that extra B batteries must be used.

What is needed is some sort of a method of using this six-volt storage battery current in producing the high plate voltage. A new type of converter should be invented, but just what form it will take is rather difficult to predict. It might be a vibrator without revolving parts. At any rate it is a big problem, the solution of which will make some smart fellow terribly rich.

Specifications: Should cost about ten dollars and should supply all of the high voltage necessary to operate the larger amplifying tubes of radio sets.

Exploitation: Should be licensed to all makers of auto radios.

Hotter than Coal
and no dirt

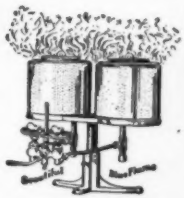
FITS ALL FURNACES

A New Invention Do away *forever* with the drudgery of wood and coal. The most simple and economical invention on the market is now giving perfect satisfaction to enthusiastic users everywhere. This new invention is a new type of oil burner that takes the place of wood or coal and automatically and silently changes cheap oil into one of the quickest and hottest fires known.

Burns 96% Air and 4% Cheap Oil

The International Oil Burner fits in the fire box of your present range, stove, or furnace. It can be installed in a few minutes by anyone. There is nothing complicated about the International Oil Burner. It gives you all the heat you want—when you want it. Starts instantly with a match. No soot, smoke, or odor. Costs less than coal.

FITS ANY COOK-STOVE



Double Blue Flame Burner for cook stoves, ranges, and parlor circulators. Burns with beautiful clean blue flame.

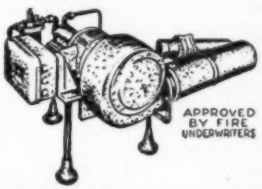
Costs Only a Few Dollars

International Oil Burners heat just as well as burners costing $400 or $500. Simply turn 1 valve and you have all the heat you want. Cleaner and better for heating or cooking. Approved by the National Underwriters' Laboratories and engineers everywhere. Over 150,000 have been sold.

FITS ANY HEATING-STOVE

30 Days' TRIAL OFFER

Try this wonderful automatic oil burner right in your own home at our risk. Act quickly and get our special low introductory price. Sold under absolute money-back guarantee. Write at once for **free** booklet on home heating and our **free** burner offer.



All-Electric Power Burner designed for larger houses, apartments, etc.

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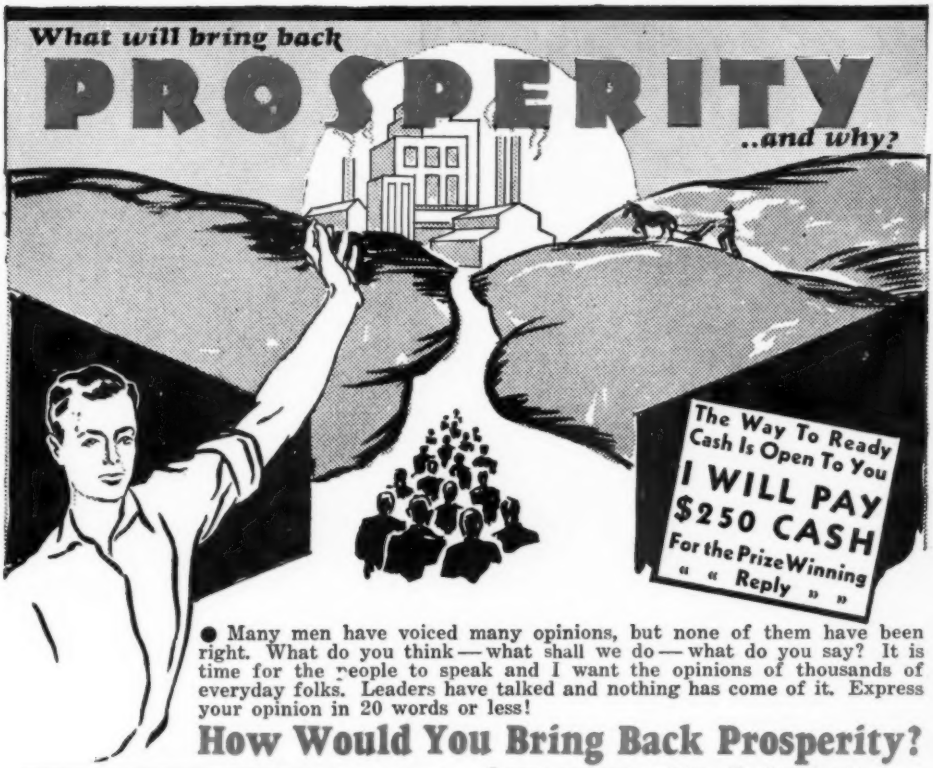

● Many men have voiced many opinions, but none of them have been right. What do you think — what shall we do — what do you say? It is time for the people to speak and I want the opinions of thousands of everyday folks. Leaders have talked and nothing has come of it. Express your opinion in 20 words or less!

How Would You Bring Back Prosperity?

I want everyone's opinion. No ties of aristocracy, wealth, race or creed can govern good judgment or right thinking. So everybody, men and women, write me what you think. What shall we do and how shall we do it?

You Will Get $250.00

for your suggestion, should it, in the opinion of the judges, best answer this question. Use the coupon or write on any paper you wish—a postal card will do. Use pen or pencil—grammar, style, punctuation or handwriting do not count. It is the suggestion you make that will be judged. What will help to bring back prosperity—and why?" Write your suggestion today!

What do I think about this? How would I bring back prosperity?—Fortune is not a matter of luck—it does not just happen. It will come now, as it always has in the past, to those who want to work and will do whatever work they find to do. People who make things and sell them. To my mind it all simmers down to one simple idea—

PROSPERITY AWAITS THOSE WHO WILL WORK

Your suitable answer will qualify you for the further opportunity to

WIN $3,500.00 CASH

This stupendous prize is separate and distinct from the cash prize offered for your suggestion, "(What Will Help Bring Back Prosperity—and Why?" Not often is there offered such a chance to win a fortune. Many people's life savings are less than this. It might mean a little yearly income for declining years, pay your debts, lift your mortgage, help with education, furnish a home—buy food or clothes. It is possible for any man or woman to win. But first you must have the will to win—wishing will not help. Here's what you do today. Write me your suggestion and mail it to me now—just doing that qualifies you for this opportunity.

BE PROMPT . . . I WILL SEND YOU A $100.00 CASH CERTIFICATE AT ONCE

To make it worth your while to send in your suggestion promptly on "What Will Help to Bring Back Prosperity—and Why?—if you will see that your letter is postmarked not more than three days after you read this offer, I will send you a Cash Promptness Certificate. This Certificate entitles you to an extra $100.00 in Cash should your suggestion, in the opinion of the judges, win the $250.00 Cash Prize offered above.

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Hundreds of worthy people have benefitted from the financial help we have given them in the past year. We have given away hundreds and thousands of dollars. Dennis Beemer of Utica, Michigan, received $5,700.00. Just write your suggestion in reply to my question—do it in 20 words or less—your own idea expressed in your own way. Use the coupon, or any piece of paper—a postal card if you like. The suggestion that best answers this question, in the opinion of the judges, will be awarded the prize. All replies must bear postmark not later than February 11, 1933. All replies to be the property of Richard Day, Manager. Duplicate prizes will be awarded in case of ties. Mail today to

RICHARD DAY, Manager
909 Cheapside Dept. P-203-K Cincinnati, Ohio

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RICHARD DAY, Manager,
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Here's what I think will help bring back prosperity—and why:

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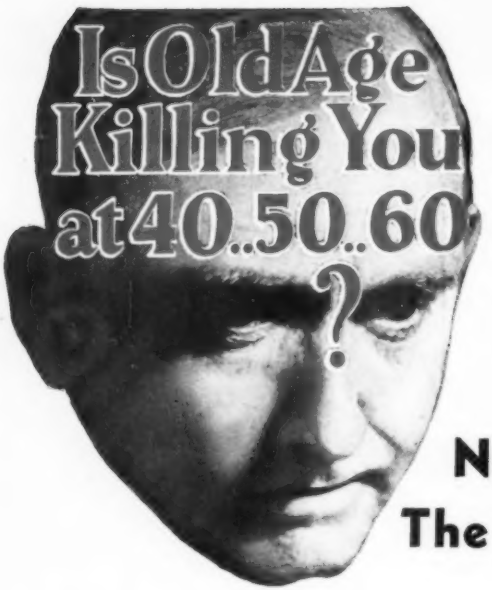
Name.....

Address.....

Town.....**State**.....

Date I Read Your Offer.....



Are you aging too soon—getting up 5 to 10 times at night—is vitality ebbing steadily away—are you definitely on the down grade, half-living, blue, depressed—are you subject to chronic constipation, chronic fatigue, backache, foot and leg pains? Then look to the vital prostate gland!

New Facts About The Prostate Gland!

DO YOU think it is natural for a man to suffer at or beyond a certain middle age? In men past 40, do you know that these symptoms are often the direct result of prostate failure? Are you aware that these critical symptoms frequently warn of the most critical period of a man's life, and that prostate trouble, unchecked, usually goes from bad to worse—that it frequently leads to months and even years of fruitless treatment and even surgery—that it even threatens life itself?

Free to Men Past 40

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There is little or nothing that medicine can do for the prostate gland. Massage is annoying, expensive and not always effective. Now this Scientist has perfected a totally different kind of treatment that you can use in the privacy of your own home. It employs no drugs, medicine, violet rays, diets or exercises. It stimulates the vital prostate gland in a new natural way, and it is as harmless as brushing your hair. 100,000 men have used it with remarkable results.

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